SANSKRIT ASTRONOMICAL TABLES IN ENGLAND

DAVID PINGREE
Brown University, Providence, Rhode Island, U.S.

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THE KUPPUSWAMI SASTRI RESEARCH INSTITUTE
MADRAS-600004
1973

Rs. 35/-

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FOREWORD

In the field of the study of the sciences of ancient India, in which fresh interest has grown recently in India and abroad, one of the most active and competent scholars whose work has already borne good fruits is Dr. David Pingree. I have been watching and keeping in touch with his work since his first visit to India in the fifties.

A student of Prof. D. H. H. Ingalls, Pingree chose the field of *Jyotiś śāstra* in Sanskrit for his specialisation. His work comprises not only examination of particular *Jyotiṣa* texts (e.g. *Pañcasiddhāntikā*) and their edition (e.g. a different *Pauliśa*) but also a comprehensive survey of astronomical and astrological mss., *A Census of the Exact Sciences in Sanskrit* as he calls it, and for this purpose, has spent considerable time with the mss. collections in India, Europe and America, and also with those in the Middle East. The last mentioned part of his work has led to his discovering significant links in the history of the growth of Indian *Jyotiṣa* and its connections with the Middle East and Greece. Some of the results of his investigations and discoveries in this line have been published in our own *Journal of Oriental Research*: Vol. XXXI, *The Yavana Jātaka of Sphujidhvaja* (which he is also editing), Vol. XXXIII, *Indian Influence on Early Sasanian and Arabic Astronomy*; and Vols. XXXIV–V, *Indian, Sasanian and Early Islamic Astronomy and Astrology.*

His Census of Exact Sciences (Jyotiṣa) in Sanskrit is a *catalogus catalogorum* for the branch of Sanskrit literature he is concerned with, namely *Jyotisa* in all its branches, and will deal in its two parts, A and B, with Authors and Works separately in alphabetical order. Two fascicles of Part A have been brought out through the American Philosophical Society, Philadelphia (1970–71). The whole series will consist of nine volumes.

In addition to the above, Pingree undertook to present the data collected by him on *Jyotiṣa* works and authors studied by him in the different libraries in India, Nepal, Europe and U.S. in a series of volumes: His *Sanskrit Astronomical Tables in the U.S.*

(The American Philosophical Society, 1968) is a detailed supplement, so far as *Jyotiṣa* mss. are concerned, to Poleman's Census of Indic Mss. in American Libraries. The volume which we have now brought out in the K.S.R. Institute gives a similar descriptive account of *Jyotiṣa* mss. in the Libraries in England.

There have been before two pioneering Indian works, those of Sudhakara Dvivedin and S. B. Dikshit, giving a history of Sanskrit *Jyotiṣa* literature. But as Pingree says, his coverage has its speciality in greater accuracy and usefulness. For one thing, a larger mass of mss. material has come to be known since the times of Dvivedin and Dikshit.

As one who had devoted a great part of his time in mss. and cataloguing,—in connection with the *New Catalogus Catalogorum*—I naturally got interested in the labours of Pingree; he was doing the same work which, confined as it is to only one branch, went into far more detailed treatment of each work, presenting more bibliographical data and analysis and summary of contents and tables.

Becasue of the distance and time involved, the author could not add to this volume, as he wanted to, detailed indexes of authors, works, scribes, owners, other names of persons and places and Parameters. These will follow in a supplement to be issued later. We have however provided the volume with a detailed Table of Contents.

In correcting the proofs of this volume, I have been assisted by Dr. S. S. Janaki, who has been helping the work of the K.S.R. Institute as Hony. Curator. We are thankful to the G. S. Press, Madras 4 for printing this book.

V. RAGHAVAN
Hony. Director & Editor K.S.R. Institute
Journal of Oriental Research

Madras,
25-3-1973.

PREFACE

In the summer of 1969 the author was enabled to spend three weeks in England by a grant from the Division of Social Sciences of the University of Chicago. During this period he was able to search for and to study manuscripts of Sanskrit astronomical tables at the British Museum, the India Office Library, the Wellcome Historical Medical Library, and the Royal Asiatic Society in London; at the University Library and the Trinity College Library at Cambridge; and at the Bodleian Library at Oxford. The results of this investigation, supplemented by later examinations of microfilms of some of the manuscripts, are here presented. It is believed that they substantially increase our knowledge of this branch of Indian scientific activity, and it is hoped that they will stimulate similar analyses of Sanskrit astronomical tables preserved in the many manuscript-libraries in India itself.

For their indispensible assistance the author offers his sincere thanks to the authorities of the libraries mentioned above, as also to the University of Chicago for making the whole project feasible. But he owes a special debt of gratitude to Prof. V. Raghavan, who so generously gave for his perusal lists of the manuscripts of some of the English collections which he made during his visit to England and also accepted this manuscript for publication and so expertly guided it into print.

Providence, R.I.
5 February 1973

DAVID PINGREE

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CATALOGUE OF MANUSCRIPTS

BRITISH MUSEUM MANUSCRIPTS:

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Add. 14,365n (Bendall 462). 15 pp.

Pp. 1-15. *Bṛhattithicintāmaṇiṭīkā* of Viṣṇu.

Add 14,365o (Bendall 504). Ff. 132.

Ff. 1r-32r. *Romakasiddhānta* from the *Śrīṣavāyaṇa* (?) *saṃhitā*.

Add. 14,365p (Bendall 452). Ff. 1-28.

Ff. 1r-28r. *Siddhāntasundara* composed by Jñānarāja in Śaka 1425=A.D. 1503.

Add. 14,365q (Bendall 456). Ff. 1-21. On f. 21r. is written:

svasti śrī aśvagajarasendusaṃkhyāparimitaśake iṣe 'ntyapakṣe mataṅgavāsare gajajayāyāṃ pustakaṃ samāptam idaṃ. The manuscript was copied. then, at Gajajayā on 12 May 1765 Julian.

Ff. 1v-21r. *Grahalāghavodāharaṇa*, a commentary on Gaṇeśa's *Grahalāghava* composed by Visvanātha in Śaka 1534=A.D. 1612.

British Museum Add. 14,366 (Bendall 466). 38ff. On f. 12v is written:

śrīśake 1544 dundubhisaṃvatsare bhādrapadasu 15 candre idaṃ pustakaṃ janārdanena likhitaṃ. The copying was finished, then, by Janārdana on Monday 9, September 1622 Julian. Purchased from Major Thomas Best Jervis in July 1843.

F. 1r. 38 *Śīghrasiddhi* // saṃpūrṇā // jānajoyī 800.
Ff. 1v-12v. *Śīghrasiddhi* composed by Lakṣmīdhara in A.D. 1278.
Ff. 13r-13v. Table 1 of the *Śīghrasiddhi.*
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Ff. 15r-15v. Table of the *Śīghrasiddhi.*
Ff. 16r-16v. Table 4 of the *Śīghrasiddhi.*
Ff. 17r-17v. Table 5 of the *Śīghrasiddhi.*
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Ff. 25r-30v. Table 8 of the *Śīghrasiddhi.*
Ff. 31r-36v. Table 9 of the *Śīghrasiddhi.*
Ff. 37r-37v. Table 10 of the *Śīghrasiddhi.*
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British Museum Add. 26,443 (Bendall 474). Sixteen manuscripts bound together in the following order: a ff. 1-5; b ff. 1-5; c ff. 9-10, 89–90, 123–132, 135–136, and 138–146; d ff. 1–8; e ff. 1–11; f ff. 1-2; g f. 5; h ff. 1-2; i f. 1; h f. 3; g f. 6. d ff; n f, 4; j f, 2. k f, 1; l f. l. m ff; n ff; o f. 1; and p. f. 1 and 2ff. Purchased from William Erskine in 1868.

Add. 26,443a (Bendall 474A). 5 ff.

F. 1r. The first verse of the *Makaranda* of Makaranda:

> śrīsūryasiddhāntamatena samyag viśvopakārāya guroḥ
> prasādāt /
> tithyādipatraṃ vitanoti kāśyām ānandakando
> makarandanāmā //1//

This is followed by the statement: makarande tithikhaṃḍe kāśyāṃ varadau dhanaṃ 0, 0, 47, , and the first verse of Harikarṇa's commentary (composed in Saṃ. 1667=A.D. 1610):

> natvā vāgīśapadābjaṃ harikarṇo mahāmatiḥ/
> makarandahitān ślokān tanute bālabodhakān, / 1, /

F. 1r. Table 1 of the *Makaranda* for Śaka 1608 to 1752=A.D. 1686 to 1830.
F. 1r. Table 2 of the *Makaranda* for 1 to 16 years.
F. 1v. Table 3 of the *Makaranda* for 0 to 26 pakṣas.
Ff. 2r-2v. Table 4 of the *Makaranda* for 0 to 59 horizontal and, in intervals of 6, or 0 to 54 vertical.
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F. 3r. Table 6 of the *Makaranda* for 1 to 24 years. ,
F. 3r. Columns 1 to 3 of table 7 of the *Makaranda* for 0 to 14 sidereal months.
F. 3r. Columns 4 and 5 of table 7 of the *Makaranda* for 0 to 14 sidereal months.
F. 3v. Table 10 of the *Makaranda* for 1 to 24 years.
F. 3v. Table 11 of the *Makaranda* for 0 to 14.
Ff. 4r.-4v. Table of the *Makaranda* for 0 to 59 horizontal and, in intervals of 6, for 0 to 14 vertical.
Ff. 5r-5v. Table 12 of the *Makaranda* for 0 to 59 horizontal and, in intervals of 6, for 0 to 54 vertical.

Add. 26,448b. 5 ff.

Ff. 1r-1v. Text.

F. 2r. Table 1 of the Anonymous of 1638 (see *SATIUS*, pp. 59b-60b) for 1 to 13 synodic months; in the margin is written: cakra 27; 59, 33.

F. 2r. Table 2 of the Anonymous of 1638 for 1 to 14 sidereal months; in the margin is written: cakra 27; 13, 48.

F. 2r. Table 3 of the Anonymous of 1638 for 1 to 13 synodic months. The epoch position is 0; 10, 28; cf. 6; 10, 28 in table 3 of the Anonymous of 1790 (see *SATIUS*, pp. 70a-70b).

F. 2r. Table 4 of the Anonymous of 1638 for 1 to 14 sidereal months. The epoch position is 6; 20, 13; cf. 6; 0, 13 in table 4 of the Anonymous of 1790.

F. 2r. Table of the muhūrtas of the Sun's entry into 1 to 27 nakṣatras. This is the final column of table 4 of the Anonymous of 1594 (see *SATIUS*, pp. 54a-55a).

F. 2v. Table 6 of the Anonymous of 1638 for 1 to 15.

F. 2v. Table 7 of the Anonymous of 1638 for 1 to 15. The epoch position is 6; 50, 58; cf. 5; 50, 58 in table 5 of the Anonymous of 1790.

F. 2v. Table 8 of the Anonymous of 1638, but substituting the tithi number for the Sun's bhukti.

F. 2v. Table 9 of the Anonymous of 1638, but substituting the tithi number for the Sun's bhukti; cf. table 3 of the Anonymous of 1594.

F. 2v. Table of lengths of daylight and of night measured in ghaṭikās for 1 to 12 zodiacal signs. The maximum length of daylight is 33; 20 ghaṭikās in Gemini, the minimum 26; 38 ghaṭikās in Sagittarius; cf. table 15 of the Anonymous of 1741 (see *SATIUS*, pp. 67a-68b).

F. 2v. In the right-hand margin, added by a later hand. Cf. table 15 of the Anonymous of 1741.

Aries	4;47,48	Leo	4;15,11	Sagittarius	6;6.16
Taurus	0;44,45	Virgo	0;17,22	Capricorn	0;26.13
Gemini	4;9,55	Libra	2;44,16	Aquarius	1;52,29
Cancer	0;50,8	Scorpio	4;37,24	Pisces	3;41.59

With the next three tables cf. tables 9 to 11 of the *Pañcāṅgavidyādharī* and tables 16 to 18 of the Anonymous of 1741. The horizontal argument is in days and the vertical argument in fractions of a day; but the differences between the latter are 3;3,3 ghaṭikās. As there are 20 columns and the argument for column 1 is 0;1,2 ghaṭikās, the argument for column 20 is (3;3,3×19) + 0;1,2=57;58,59 ghaṭikās.

Ff. 3r-3v. Table of corrections for tithis for 0 to 27 days horizontal and in 20 columns vertical. The maximum correction is 24;48 ghaṭikās.

Ff. 4r-4v. Table of corrections for naksatras for 0 to 27 days horizontal and in 20 columns vertical. The maximum correction is 22;56 ghaṭikās.

Ff. 5r-5v. Table of corrections for yogas for 0 to 29 days horizontal and in 20 columns vertical. The maximum correction is 21;21 ghaṭikās.

Add. 26,448c (Bendall 474B). Ff. 9–10, 89–90, 123–132, 135–136, and 138–146. The tables in this manuscript are those of the *Bṛhattithicintāmaṇi* of Gaṇeśa arranged as in Poleman 4708 (Smith Indic 16) (see *SATIUS*, p. 14a).

Ff. 9r-10v. Table of cycle 1 of the *Bṛhattithicintāmaṇi*: k=26 to 140.

Ff. 89r-90v. Table of cycle 13 of the *Bṛhattithicintāmaṇi*: k=254 to 371 (tithis), 254 to 362 (nakṣatras), and 254 to 389 (yogas).

Ff. 123r-126r. Table of cycle 19 of the *Bṛhattithicintāmaṇi*: k=153 to 371 (tithis), 153 to 362 (nakṣatras), and 153 to 389 (yogas).

Ff. 126v-132v. Table of cycle 21 of the *Bṛhattithicintāmaṇi* (complete).

Ff. 135r-136v. Table of cycle 21 of the *Bṛhattithicintāmaṇi*: k=121 to 236.

Ff. 138r-139r. Table of cycle 21 of the *Bṛhattithicintāmaṇi*: k=294 to 371 (tithis), 294 to 362 (nakṣatras), and 294 to 289 (yogas).

Ff. 139v-145v. Table of cycle 22 of the *Bṛhattithicintāmaṇi* (complete).

Ff. 146v-146v. Table of cycle 23 of the *Bṛhattithicintāmaṇi*: k=0 to 61.

Add. 26,448d (Bendall 474C). Ff. 1-8 and additional folio. This manuscript and Add. 26,448g appear to have been written by the same scribe. On the recto of the additional folio is an owner's signature in English script: Sarni. This is a Mahārāṣṭrian name.

Ff. 1r-3r. Table 1 of the *Tithidarpaṇa* composed by Murāri in ca. A.D. 1665.
Ff 3v-5v. Table 2 of the *Tithidarpaṇa.*
F. 6r-8v. Table 3 of the *Tithidarpaṇa.*
F. 8v. Text.
Additional folio, recto. Text.
Additional folio, verso. Table 4 of the *Tithidarpaṇa.*

Add. 26,448e (Bendall 474D). 11 ff.

Ff. 1r-1v. *Grahaprakāśa* composed by Devadatta in 17 verses in Śaka 1584=A.D. 1662.
F. 1v. Tables 1 to 3 of the *Grahaprakāśa.*
F. 2r. Blank.
F. 2v. Tables 4 to 5 of the *Grahaprakāśa.*
Ff. 2v-3r. Table 6 of the *Grahaprakāśa.*
F. 3v. Table 7 of the *Grahaprakāśa.*
F. 4r. Text.
F. 4r. Tables 8 to 9 of the *Grahaprakāśa.*
F. 4v. Table 10 of the *Grahaprakāśa.*
Ff. 5r-5v. Tables 11 to 12 of the *Grahaprakāśa.*
F. 6r. Table 13 of the *Grahaprakāśa.*
F. 6v. Table 14 of the *Grahopraksā.*
F. 7r. Table 15 of the *Grahaprakāśa.*
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F. 9r. Tables 19 to 20 of the *Grahaprakāśa.*
F. 9v. Table 21 of the *Grahaprakāśa.*
Ff. 10r-10v. Table 22 of the *Grahaprakāśa.*
F. 11r. Table 23 of the *Grahaprakāśa.*
F. 11v. Tables 24 to 31 of the *Grahaprakāśa.*

Add. 26,448f (Bendall 474E). 2ff.

Ff. 1-2. *Grahaprakāśaṭīkā* composed by Devadatta in ca. A.D. 1662 in 24 verses

Add. 26,448g. Ff. 5-6. This manuscript was apparently written by the scribe of BM Add. 26,448d.

Ff. 5r–6v. Astrological compilation quoting Pitāmaha, Vṛddhavasiṣṭha, the *Jyotiḥprakāśa*, Gārgya, etc.

F. 6v. Table 5 of the Anonymous of 1594, table 8 of the *Pañcāṅgavidyādharī*.

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F. 1r. Tables 1 and 2 of the *Laghutithidarpaṇa*.
F. 1v. Tables 3 and 4 of the *Laghutithidarpaṇa*.
F. 2r. Tables 5 and 6 of the *Laghutithidarpaṇa*.
F. 2v. Tables 7 to 9 of the *Laghutithidarpaṇa*.
F. 3r. Tables 10 to 12 of the *Laghutithidarpaṇa*.
F. 3v. Tables 13 and 14 of the *Laghutithidarpaṇa*.
Ff. 4r-4v. *Laghutithidarpaṇa* composed by Murāri in Śaka 1587 = A.D. 1665.

Add. 26,448i. 1f.

F. 1r. Table stating that the noon equinoctial shadow is 4;30 digits.
Ff. 1r-1v. A nirayaṇalagnapatra for 0 to 11 zodiacal signs vertical 0° to 29° horizontal.

Add. 26,448j. F. 2.

Ff. 2r-2v. IV 6-VII 5 of the *Bhāsvatī* composed by Śatānanda in Śaka 1021 = A.D. 1099.

Add. 26,448k. 1f.

Ff. 1r–1v. Text in 11 verses. The 11th is:
alīmīnāsaraseharore bāhubalamunīrāya siddhākara
maṣayāvaneji vimalakīrate guṇagāya haraṣadharī navabolajoji.

Add. 26,448l. 1f.

Ff. 1r-1v. Sāyanalagnapatra for 0° to 29° horizontal, 0 to 11 zodiacal signs vertical. The vernal equinox is at Pisces 11°.

Add 26,448m. 1f.

Ff. 1r-1v. Table of the catuṣṭaikya for 0 to 365 days; cf. table 28 of the *Khetasiddhi*, table 6 of the *Grahakaumudī*. The maximum is +1;33 at day 72, the minimum -2;31 at days 283 to 285. On f. 1v.

is written: sīrohī ayanāṃśa 19/0/0. This indicates that it was written at Sirohi in Rājasthān in the eighteenth century.

Add. 26,448n. 1f.

Ff. 1r-1v. Table of half-lengths of daylight for 0° to 29° horizontal, Aries to Pisces vertical. The maximum is 16;47 ghaṭikās (× 2 = 33;34 ghaṭikās) at Gemini 10°, the minimum 13;13 ghaṭikās at Sagittarius 7° and 8°. The ayanāṃśa is given as 20°.

Add. 26,448o. 1f.

Ff. 1r-1v. Table of planetary aspects according to the *Jātakacandrikā*.

Add. 26,448p. 3ff.

F. 1r. Table of week-days on which the Sun enters each of the 27 nakṣatras (very similar to table 16 of the *Makaranda*); of the lengths of daylight (the maximum is 33;10 ghaṭikās at Punarvasu, the minimum 26;51 ghaṭikās at Uttarāṣāḍhā); and of two other unexplained functions.

F. 1v. Mean motion tables of the Lord of the year for 0 to 16 years and for 0 to 16 periods of 16 years. The yearly parameter is 1;15,31,31,24 days; the epoch position is 2;14,55,31 days.

F. 1v. Table of week-days on which the Sun enters each of the 12 zodiacal signs (identical with table 15 of the *Makaranda*) and of the Sun's daily progresses.

F. 1v. Table of parameters for 16-year periods and single years with the cycles.

	labdhaguṇas	śeṣaguṇas	cakras
Lord of the year	6;8,26,22	1;15,31,31,24	7
Tithivāra	27;6,6,12	11;1,12,42	30
Nakṣatravāra	24;5,48,9	10.1,18,3	27
Yogavāra	24;5,49,3	10;1,17,53	27
Tithikendra	2;45,8,30	7;36,18,0	30
Nakṣatrakendra	2;25,30.0	7.43,13,30	30
Yogakendra	2;27,2,0	7;43,2,0	30

Cf. table 8 (of the *Tithicintāmaṇi*). These are the parameters of the Saurapakṣa.

F. 2r. Mean motion tables of tithis and tithivāras for 0 to 16 years and 0 to 12 periods of 16 years. The tithi's parameter for 16 years is 27, the tithivāra's 6;6,12 days; cf. table 1 of the *Makaranda*.

F. 2r. Mean motion tables of the tithikendras for 0 to 16 years and 0 to 12 periods of 16 years. The parameter for 16 years is 2;45,8,30.

Ff. 2v-3v. Skeletons of similar tables; not filled in.

Cambridge University Library Add. 2407. 27ff. On f. 27v is written: saṃvat 1901 śakaḥ 1766 dvitīyaśrāvaṇavadi 11 bhṛgudine chaṃgāmiśreṇa haragoviṃdapaṭhanārthaṃ lipīkṛtaṃ pustakam// haragoviṃdanāmapautraś ciraṃjīvī bhavatu / sārasvateṣu aṣṭavaṃśa ṣaḍaṃgajñātīyaḥ. The copying was finished, then, on Friday 25, August 1844 Julian by Chaṅgāmiśra Sārasvata of the Ṣaḍaṅgajñāti for his grandson Haragovinda.

Ff. 1v-27v. *Makarandasyodāharaṇa* composed by Viśvanātha in Śaka 1544 = A.D. 1622.

Cambridge University Library Add. 2430. 8ff. On f. 8v is written: saṃ 1887 caitrakṛṣṇa 8 ravau li motīrāma sārasvata brāhmaṇa śaṃḍajñātīyena. The copying was finished, then, on Sunday, 6 April, 1830, Julian by Motīrāma Sārasvata, a brāhmaṇa of the Śaṇḍajñāti.

Ff. 1v-8v. *Abhinavatāmarasa*, a commentary on the *Makaranda*, composed by Puruṣottama in A.D. 1631.

Cambridge University Library Add. 2455. 11ff.

Ff. 1v-11 r. *Makarandavivaraṇa* composed by Divākara in 149 verses in ca. A.D. 1650.

Cambridge University Library Add. 2557. Ff. 1–114, 126–128, 141–143 and 149–51. On f. 151r is written: saṃvat 1823 varṣe aśvinimāse śukrapakṣe trayodaśyāṃ tithau ravivāsare vṛddhināmni yoge śrīmadvijayagacche muni śrī 108 tejapālajī tadaṃtevāsinā ṛṣi <pā>śakarṇenālekhi. The copying was finished, then, on Sunday, 8 October, 1766 Julian by <Pā>śakarṇa, the student of Tejapālajī in the Vijayagaccha. On f. 1r is written: pustakam idaṃ śesilaoeṇḍālamaheśayaprabodhitena medapāṭodaya–purādhīśapaṇḍitarāmapratāpena kembrijasarvavidyālayapustakālayāya samarpitam.

It was given to Cambridge University Library, then, by Rāmapratāpa, paṇḍita of the ruler of Medapāṭodayapura (Udaipur, Mewar, Rajasthan), at the instigation of Cecil Bendall.

F. 1v. Skeleton of a table; not filled in.
Ff. 2r-31r. Table 9 of the *Mahādevī* for N = 0 to 59.
Ff. 31v-61r. Table 10 of the *Mahādevī* for N = 0 to 59.
Ff. 61v-91r. Table 11 of the *Mahādevī* for N = 0 to 59.
Ff. 91v-114v. Table 12 of the *Mahādevī* for N = 0 to 46.
Ff. 126r-128v. Table 13 of the *Mahādevī* for N = 9 to 12.
Ff. 141r-143v. Table 13 of the *Mahādevī* for N = 39 to 44.
Ff. 149r-151r. Table 13 of the *Mahādevī* for N = 55 to 59.

India Office 520. A manuscript consisting of five parts written by one hand. Presented by H. T. Colebrooke.

520a (Eggeling 2893). 58ff. A copy of this is India Office 2292 (Eggeling 2804). 24ff. From Calcutta.

Ff. 1v-58r. *Śeṣavāsanā* composed by Kamalākara in ca. A.D. 1660.

520b (Eggeling 2952). 26ff. On f. 26r. is written: liṣitaṃ hebhadattena ātmapāṭhārthaṃ. A copy of this is India Office 2300 (Eggeling 2953). 16ff. From Calcutta.

Ff. 1v-26r. *Viṣṇukaraṇodāharaṇa* with calculations for Monday 15 Vaiśākha Saṃvat 1669, Śaka 1534 = 4 May, 1612, Julian.

520c (Eggelin 2950). 24ff. A copy of this is India Office 2265 (Eggeling 2951). 10ff. From Calcutta.

Ff. 1v-24r. Abhinavaprakāra from the *Sūryapakṣaśaraṇa* composed by Viṣṇu in Śaka 1530 = A.D. 1608.

520d (Eggeling 2958). 16ff. A copy of this is India Office 2303 (Eggeling 2959). 8ff. From Calcutta.

Ff. 1v-16v. *Abhinavatāmarasa*, a commentary on Makaranda's *Makaranda*, composed by Puruṣottama in A.D. 1631.

520e (Eggeling 2788). 23ff. A copy of this is India Office 2296 (Eggeling 2790). 15ff. From Calcutta.

Ff. 1v-23r. *Gaṇitasāra* or *Triśatikā* composed by Śrīdhara in ca. 900. India Office 983 (Eggeling 2963). Ff. 1–13, 13bis–33, and 33bis–52. Bengālī script. Presented by H. T. Colebrooke.

Ff. 1v-13v. *Gaṇitarāja* composed by Kevalarāma Pañcānana, in A.D. 1728.
F. 13bis r. Tables 1 to 5 of the *Gaṇitarāja.*
F. 13bis v. Tables 6 to 7 of the *Gaṇitarāja.*
F. 14r. Table 8 of the *Gaṇitarāja.*
Ff. 14r-14v. Table 9 of the *Gaṇitarāja.*
Ff. 14v-15r. Table 10 of the *Gaṇitarāja.*
Ff. 15r-15v. Table 11 of the *Gaṇitarāja.*
Ff . 15v-17v. Table 12 of the *Gaṇitarāja.*
Ff. 18r-19r. Table 13 of the *Gaṇitarāja.*
Ff. 19r-21v. Table 14 of the *Gaṇitarāja.*
Ff. 21–22v. Table 15 of the *Gaṇitarāja.*
Ff . 22v–24v. Table 16 of the *Gaṇitarāja.*
Ff. 24v–25v. Table 17 of the *Gaṇitarāja.*
F. 25v. Table 18 of the *Gaṇitārāja.*
F. 26r. Tables 19 to 20 of the *Gaṇitarāja.*
Ff. 26r–28r. Table 21 of the *Gaṇitarāja.*
F. 28r. Table 22 of the *Gaṇitarāja.*
Ff. 28r–30r. Table 23 of the *Gannitarāja.*
F. 30r. Tables 24 to 26 of the *Gaṇitarāja.*
F. 30v. Tables 27 to 29 of the *Gaṇitarāja.*
Ff. 31r–32v. Table 30 of the *Gaṇitarāja.*
Ff. 32v-33bs r. Table 31 of the *Gaṇitarāja.*
Ff. 33bis v–34v. Table 32 of the *Gaṇitarāja.*
Ff. 34v–36r. Table 33 of the *Gaṇitarāja.*
Ff. 36r–37v. Table 34 of the *Gaṇitarāja.*
Ff. 37v–38v. Table 35 of the *Gaṇitarāja.*
F. 38v. Table 36 of the *Gaṇitarāja.*
Ff. 39r–39v. Table 37 of the *Gaṇitarāja.*
Ff. 39v–40v. Table 38 of the *Gaṇitarāja.*
Ff. 40v–41v. Table 39 of the *Gaṇitarāja.*
Ff. 41v–42r. Table 40 of the *Gaṇitarāja.*
Ff. 42r–43r. Table 41 of the *Gaṇitarāja.*
Ff. 43r-44r. Table 42 of the *Gaṇitarāja.*
Ff. 44r–44v. Table 43 of the *Gaṇitarāja.*
Ff. 44v–45v. Table 44 of the *Gaṇitarāja.*
Ff. 45v–46v. Table 45 of the *Gaṇitarāja.*
Ff. 46v–47v. Table 46 of the *Gaṇitarāja.*
Ff. 47v–48v. Table 47 of the *Gaṇitarāja.*
Ff. 48v–49v. Table 48 of the *Gaṇitarāja.*

Ff. 49v–50v. Table 49 of the *Gaṇitarāja*.
Ff. 50v–51v. Table 50 of the *Gaṇitarāja*.
Ff. 51v–52v. Table 51 of the *Gaṇitarāja*.

India Office 1681. Two manuscripts bound together. Presented by H. T. Colebrooke.

1681a (Eggeling 3137). 43ff. On f. 43r, is written: saṃvat 1855 mīḥ. It was copied, then, in A.D. 1798/9.
Ff. 1v–43r. *Meghamālā* ascribed to Mahādeva (= Śiva).

1681b (Eggeling 2957). 26ff. On f. 26r. is written: saṃvat 1842. It was copied, then, in A.D. 1785/6.

Ff. 1–26r. *Makarandasyodāhṛti* composed by Viśvanātha in Śaka 1544 = A.D. 1622.

India Office 1990. Three manuscripts written by the same hand bound together. Bequeathed by John Taylor, M.D., of Bombay on 20 April, 1822.

1990a (Eggeling 2939). 14ff.

Ff. 1-14. *Grahalāghava* (I–VI and IX) composed by Gaṇeśa in Śaka 1442 = A.D. 1520.

1990b (Eggeling 2943). 3ff. On f. 3v is written: idaṃ pustakaṃ śake 1718 analanāmasaṃvatsare //

laghuciṃtāmaṇiṃ lekhyaṃ mādhave māsy udagayanaṃ /
vadyapakṣe cāṣṭamī ca somāśvinī ca lekhayā //1//
sūryodayād uparītayāmadivasalekhayā /
pāvasagrāmāṃtavṛtyāṃśī sidhāṃti jyotiṣīya ca //2//
yajñeśvarasya nāmnīyāt ciṃtāmaṇasya sūnunā //3//

The copying was finished, then, on 19 May, 1796 Julian by Yajñeśvara, the son of Cintāmaṇa and a resident of Pāvasagrāma.
Ff. 1v–3v. *Laghucintāmaṇi* composed by Gaṇeśa in Śaka 1447 = A.D. 1525.

1990c (Eggeling 2940). 10ff.
Ff. 1–10. *Grahalāghava* (I–VI) composed by Gaṇeśa in Śaka 1442 = A.D. 1520.

India Office 2000 (Eggeling 2942). 28ff. in four parts: A 4ff.; B 8ff.; C 7ff.; and D 9ff. On A f. 4r is written: śake 1705 śobhakṛt āśvinakṛṣṇacaturthyāṃ saṃpūrṇaṃ // cintāmaṇena lekheyaṃ

nārāyaṇaṃ ca dīyate / upadeśaṃ ca rakṣaṇyaṃ tadarthaṃ dattu pustakaṃ. This indicates that it was copied by Citāmaṇa on 15 October, 1783 Julian, and given to Nārāyaṇa to study and preserve. Bequeathed by John Taylor, M.D., of Bombay on 20 April, 1822; it was ms. 89 in his collection.

A Ff. 1v–4r. *Tithicintāmaṇi* composed by Gaṇeśa in Śaka 1447 = A.D. 1525.

B F. 1r. Blank.

Ff. 1v–7v. Table 3 of the *Tithicintāmaṇi* for 0 to 420 yogas.

F. 8r. Table of yearly cālakas which differ from line 2 of Table 8 of the *Tithicintāmaṇi*.

Function	Cālaka	Function	Cālaka
abdapa	1;15,31 days	spaṣṭatithikendra	7;5,55 days
śuddhi	11;3,53 tithis	spaṣṭanakṣatra-kendra	7;0,23
tithidhruva	10;53,7 days	spaṣṭayogakendra	7;31,52
nakṣatradhruva	10;2,31	tithibhoga	1;11,42
yogadhruva	10;2,31	nakṣatrabhoga	1;18,4
madhyatithikendra	7;9,48	yogabhoga	1;17,53
madhyanakṣatra-kendra	6;57,52	bhabhoga	1;13,4
madhyayoga-kendra	7;29,31		

F. 8r. Table 4 of the *Tithicintāmaṇi* for 1 to 27 nakṣatras.

F. 8r. Table 5 of the *Tithicintāmaṇi* for 1 to 12 zodiacal signs.,

F. 8v. Blank.

C. F. 1r. Blank.

Ff. 1v–7v. Table 2 of the *Tithicintāmaṇi* for 0 to 390 nakṣatras.

D. F. 1r. Blank.

Ff. 1v–9r. Table 1 of the *Tithicintāmaṇi* for 0 to 400 tithis.

F. 9r. A table entitled: tithisaṅkrānti.

Aries	− 33	Leo	− 26	Sagittarius	+ 43
Taurus	− 22	Virgo	− 68	Capricorn	+ 53
Gemini	− 20	Libra	+ 244	Aquarius	+156
Cancer	− 19	Scorpio	+ 57	Pisces	− 84[8] (sic)

The significance of this table is not clear.

F. 9v. Blank.

India Office 2049. Four manuscripts bound together. Presented by the Gaikawar on 29 September, 1809.

2049a (Eggeling 3001). No. 265 in the Gaikawar's collection. 20ff. On f. 20v is written: śrībāvallīgrāme // kalyāṇanidhānaśiṣyalabdhicaṃdra li. It was copied in Bāvallīgrāma (Bavliari, Gujarat), then, by Labdhicandra, the pupil of Kalyāṇanidhāna.

Ff. 1v–20v. *Jyotiṣasāroddhāra* (incomplete) composed by Harṣakīrti.

2049b (Eggeling 3043). 30ff. On f. 30r. is written: saṃvat 1688 varṣe caitrasudi 9 bhṛguvāsare bhaṭaśrī 5 gokula liṣitam idaṃ. The copying was finished, then, by Gokula Bhaṭa on Friday 1 April, 1631 Julian.

Ff. 1v–30r. *Aṭhavīsanakṣatraphala,* for which see 10 Gujarātī 1225 A II.

2049c (Eggeling 2967). No. 210 in the Gaikawar's collection. 24ff. On f. 1r. is written: bhaṭaprobhūjī jīvarāja nī pratiḥ dhanaphalī che paṃnā 24. It belonged, then, to Jīvarāja, <the son of> Bhaṭa Prabhūjī <of the Girinārāyaṇajñāti>.

Ff. 1v–8v. Table of equations of the tithikendra for 0 to 27 days horizontal and for 0 to 59 ghaṭīs vertical. The maximum is 1;5,57 at 0;59 days, the minimum 0;35,13 at 21;23 to 21.227 days; the entry at 0;0 days is 1:0,0. One expects in this table as in the following two a higher maximum; cf. tables 6 to 8 of the Anonymous of 1594 (*Satius,* p. 55a).

Ff. 9r–16r. Table of equations of the nakṣatrakendra for 0 to 27 days horizontal, and for 0 to 59 ghaṭīs vertical. The maximum is 1;5,35 at 0;59 days, the minimum 0;37,4 at 20;47 to 20;51 days; the entry at 0;0 days is 1,0,0.

Ff. 16v–23v. Table of equations of the yogakendra for 0 to 29 days horizontal, and for 0 to 59 ghaṭīs vertical. The maximum is 1;4,50 at 0:59 days, the minimum 0;38,40 at 22;16 to 22;17 days; the entry at 0;0 days is 1:0,0.

F. 24r. Table of the beginnings of the nakṣatracaraṇas; cf. table 41 of the *Makaranda.*

F. 24v. Blank.

2049d (Eggeling 3039). No. 267 in the Gaikawar's collection. 14ff.

Ff. 1v-14v. *Bhuvanadīpaka* composed by Padmaprabhu (a) Sūri with an interlinear interpretation in Gujarātī.

India Office 2083. Four manuscripts bound together. Presented by the Gaikawar on 29 September, 1809.

2083a (Eggeling 2969). No 214 in the Gaikawar's collection. Ff. 5–37. On f. 37v is written: garāśiyā cādā bhāïjī/sirnaja bhālama/ paṃdita gokala abaidāsa/bhāï bhagavāna āpaṇe milā 4/pacha. This manuscript contains the tables of the *Grahaprabodhasāriṇī* composed by Yādava in Śaka 1585 = A.D. 1663.

Ff. 5r–5v. Table 2 of the *Grahaprabodhasāriṇī*.
Ff. 6r–6v. Table 3 of the *Grahaprabodhasāriṇī*.
Ff. 7r–7v. Table 4 of the *Grahaprabodhasāriṇī*.
Ff. 8r–8v. Table 5 of the *Grahaprabodhasāriṇī*.
Ff. 9r–9v. Table 6 of the *Grahaprabodhasāriṇī*.
Ff. 10r–10v. Table 7 of the *Grahaprabodhasāriṇī*.
Ff. 11r–11v. Table 8 of the *Grahaprabodhasāriṇī*.
Ff. 12r–12v. Table 9 of the *Grahaprabodhasāriṇī*.
Ff. 13r–13v. Table 10 of the *Grahaprabodhasāriṇī*.
Ff. 14r–15v. Table 11 of the *Grahaprabodhasāriṇī*.
Ff. 16r–17v. Table 12 of the *Grahaprabodhasāriṇī*.
Ff. 18r–19v. Table 13 of the *Grahaprabodhasāriṇī*.
Ff. 20r–20v. Table 18 of the *Grahaprabodhasāriṇī*.
Ff. 21r–22v. Table 14 of the *Grahaprabodhasāriṇī*.
Ff. 23r–23v. Table 19 of the *Grahaprabodhasāriṇī*.
Ff. 24r–25v. Table 15 of the *Grahaprabodhasāriṇī*.
Ff. 26r–26v. Table 20 of the *Grahaprabodhasāriṇī*.
Ff. 27r–28v. Table 16 of the *Grahaprabodhasāriṇī*.
Ff. 29r–29v. Table 21 of the *Grahaprabodhasāriṇī*.
Ff. 30r–31v. Table 17 of the *Grahaprabodhasāriṇī*.
Ff. 32r–32v. Table 22 of the *Grahaprabodhasāriṇī*.

Ff. 33r–33v. Table 23 of the *Grahaprabodhasāriṇī*, divided into two parts; on ff. 33r–33v is the table of gatiphalas, on f. 33v that of guṇas.

Ff. 34r–37r. Table of the lengths of daylight, measured in ghaṭikās and viṇāḍikās, for 1 to 366 days; also given are the times in the

same units between sunrise and the Sun's crossing of the six o'clock circle (the caradala). The longest day is 33;12 ghaṭikās on day 94; the shortest 26;48 on day 277.

2083b (Eggeling 2970). No. 215 in the Gaikawar's collection.

Ff. 1–2 and 4–8. On f. 8v a different hand has inscribed a text which mentions the date Śaka 1442 = A.D. 1520, the epoch of Gaṇeśa's *Grahalāghava*. In tables 1 to 9 dhruvāṅkas 3 to 30 are given.

F. 1r. Tables 1 and 2 of the *Grahal*^{a}*ghavasāriṇī* I.
Ff. 1r–lv. Table 3 of the *Grahalāghavasāriṇī* I.
F. 1v. Table 4 of the *Grahalāghavasāriṇī* I.
F. 2r. Tables 6 and 7 of the *Grahalāghavasāriṇī* I.
Ff. 2r–2v. Table 8 of the *Grahalāghavasāriṇī* I.
F. 2v. Table 9 of the *Grahalāghavasāriṇī* I.
F. 2v. Beginning of table 10 of the *Grahalāghavasāriṇī* I, for 1° to 40°.
F. 4r. End of table 13 of the *Grahalāghavasāriṇī* I, for 28° to 90°.
Ff. 4r–4v. Table 14 of the *Grahalāghavasāriṇī* I.
F. 4v. Table 15 of the *Grahalāghavasāriṇī* I.
Ff. 4v–5r. Table 16 of the *Grahalāghavasāriṇī* I.
Ff. 5r–6r. Table 17 of the *Grahalāghavasāriṇī* I.
Ff. 6r–6v. Table 18 of the *Grahalāghavasāriṇī* I.
Ff. 6v–7r. Table 19 of the *Grahalāghavasāriṇī* I.
Fr. 7r–7v. Table 20 of the *Grahalāghavasāriṇī* I.
Ff. 7v–8r. Table 21 of the *Grahalāghavasāriṇī* I.
F. 8v. Astronomical text, in different hand.

2083c (Eggeling 2961). No. 219 in the Gaikawar's collection. Ff. 1–6. On f. 6v is written: liṣitaṃ bhaṭa śrī 5 prabhūjīsutamorārajikena liṣitaṃ svārthaṃ // bhāī śrī 5 jīvarāja tathā valabhajī paṭhanārthaṃ //. This indicates that it was copied by Morārajīka, the son of Prabhūjī Bhaṭa <of the Girinārāyaṇajñāti>, for his own use and that of his brothers Jīvarāja and Valabhajī.

Ff. 1v–6v. *Grahavidyādhara*, composed by Vidyādhara in Śaka 1560 = A.D. 1638.

F. 4v. Table of mean daily motions.

2083d and e (Eggeling 2945 and 2946). No. 213 in the Gaikawar's collection. The manuscript consists of two parts: A (2083d) ff. 1–3 and B (2083e) ff. 1–71.

A (2083d) ff. 1v–3v. *Grahakaumudī* composed by Nṛsiṃha in Śaka 1525 = A.D. 1603.

B (2083e) ff. 1r-14r. Table 1 of the *Grahakaumudī*.

Ff. 14v-27v. Table 2 of the *Grahakaumudī*.
Ff. 28r-41r. Table 3 of the *Grahakaumudī*.
Ff. 41v-54v. Table 4 of the *Grahakaumudī*.
Ff. 55r-68r. Table 5 of the *Grahakaumudī*.
F. 68v. Table 6 of the *Grahakaumudī*.
F. 71r. Table 8 of the *Grahakaumudī*.
F. 71v. Blank.

India Office 2252 (Eggeling 2971). Ff. A, 1–13 B, and 14-88. On f. 88r is written: saṃvat 1755 varṣe śake 1620 pra mālavamāne māghavadī 2 śanau ghaṭī 32;46 āśleṣā ghaṭī 20;29 āyuṣmān ghaṭī 26;17 evaṃ paṃcāṃgaśuddhau taddine prathamarātrīgataghaṭī 8;—tamayeku arado latasīṃghajī gṛhe bhāryā vahurāvalaputrajanma // sūrya 9 9;35. This refers to the nativity of Bahurāvala, the son of Latasiṃha, on Saturday 4 February 1699 Julian at 32;46 ghaṭīs when, according to the *Pañcāṅgaśuddhi*, the Moon was in the nakṣatra Āśleṣa 20;29 ghaṭīs and 26;17 ghaṭīs of the yoga Āyuṣmān had elapsed; the Sun was in Capricorn (!) 9;35. The tropical longitudes of the Sun and Moon at sunset on this day were Aquarius 26° and ca. Leo 20°. On f. Bv is written: paṃ manarāma goviṃda śamanā patra 87 che bhramaṇanāṃ. The paṇḍita, Maṇirāma Govinda Śarman, was undoubtedly an early owner of the manuscript. Presented by the Gaikawar on 29 September, 1809.

F. Ar. Table of the true longitudes of the Sun for 1 to 27 avadhis and of the Sun's daily progress during each avadhi. The entry for k = 1 is 2;7,39°, that for k = 27150;53,48°. The maximum daily progress is 1;1,24° at k = 20, the minimum 0;56,53° at k = 7. Cf. table 17 of the *Jagadbhūṣaṇa* and f. 86v. below.

F. Ar. Table of the longitudes of the lunar node for 1 to 27 avadhis. The motion in 26 avadhis (= 364 days) is –19;29,17°; the daily motion, then, is –0;3,10,45, . . .°. Cf. table 20 of the *Jagadbhūṣaṇa* and f. 86 v below.

F. Av. Table of the longitudes of the lunar node for 1 to 93 years. This is table 19 of the *Jagadbhūṣaṇa*, but, like the planetary tables

below, it begins with the year 1 (= A.D. 1639) rather than with the year 0 (= A.D. 1638). This statement is confirmed by the entries for k = 1 in all the relevant tables.

	k = 1	true tropical longitudes for 28 Mar. 1639	differences
Saturn	4,54;26,11°	5,17°	–23°
Jupiter	3,47;34,25	4,5	–17
Mars	35;35,37	54	–18
Sun	——	18	–18
Venus	15;0,42	30	–15
Mercury	5,53;33,31	1	–7
Lunar node	4,3;31,8	4,22	–18

Ff. 1r–14r. Table 1 (Mars) of the *Jagadbhūṣaṇa* for N = 1 to 79. On f. 1r the date is given as <Śaka> 1571; one must rather read Śaka 1561 = A.D. 1639.
Ff. 14v–22r. Table 2 (Mercury) of the *Jagadbhūṣaṇa* for N = A.D. 1639.
Ff 14v–22r. Table 2 (Mercury) of the *Jagadbhūṣaṇa* for N = 1 to 46.
Ff. 22v–36r. Table 3 (Jupiter) of the *Jagadbhūṣaṇa* for N = 1 to 83.
Ff. 36v.–72v and 73v–74v. Table 4 (Venus) of the *Jagadbhūṣaṇa* for N = 1 to 227.
F. 73r. Tables of phaṇicakra and sarvatobhadracakra.
F. 75r. Blank.
Ff. 75v–79r. and 80r–85v. Table 5 (Saturn) of the *Jagadbhūṣaṇa* for N = 1 to 59.
F. 79v. Skeleton of table; not filled in.
F. 86r. Table 19 of the *Jagadbhūṣaṇa* for 1 to 93 years.
F. 86v. Table 17 of the *Jagadbhūṣaṇa* for k = 1 to 27; but the entry for k = 1 is 2;9,40° and that for k = 27 is 0;55,48°.
F. 86v. Table of the traikya for 1 to 27 avadhis; cf. column 5 of table 16 of the *Jagadbhūṣaṇa*.

1	+0;25	10	0;51	19	1;38
2	0;51	11	0;43	20	1;50
3	1;20	12	0;33	21	1;58
4	1;29	13	0;23	22	1;54
5	1;44	14	+0;10	23	1;37
6	1;45	15	−0;7	24	1;15
7	1;33	16	0;25	25	0;45
8	1;23	17	0;51	26	−0;12
9	1;8	18	1;14	27	+0;23

F. 86v. Table 19 of the *Jagadbhūṣaṇa* for k=1 to 27; but the entry for k=27 is −19; 17, 34°.
F. 87r. Table 8 of the *Jagadbhūṣaṇa* for 1 to 122 years. The epact for year 1 is 7;15,35 which gives a lunar longitude of 1,27;7°.
F. 87v. Table 6 of the *Jagadbhūṣaṇa* for 1 to 89 years. The lord of the year for year 1 is 1;11,45,47—a Monday, as is 28 March 1639.
India Office 2408. Three manuscripts bound together. Presented by the Gaikawar on 29 September 1809.

2408a (Eggeling 2924). No. 211 of the Gaikawar's collection. 13ff. On f. 13v. is written: saṃvat 1656 varṣe śāke 1521 pravarttamāne/mārgaśīraśudi dvitiyā bhṛgau adyeha śrīgiri-nārāyaṇājñātīya/paṃdyā narasiṃhasutapuruṣottamena likhitaṃ/ paropakārārtham//. It was copied, then, by Puruṣottama, the son of Narasiṃha of the Girinārāyaṇajñāti; the copying was completed on Friday 9, November 1599 Julian.

Ff. 1v–13v. *Gaṇitacūḍāmaṇi* composed by Harihara in ca. A.D. 1580.

2408b (Eggeling 2930). No. 212 of the Gaikawar's collection. 9ff. On f. 9r is written: saṃvat 1611 varṣe śāke 1477 pravartamāne caitraśudi 3 some/adyeha śrījīrnadurge vāstavyaḥ śrīgirinārāyaṇa-jñātīyaḥ sāṃkalīyāpāṃḍyā śrīvidyādharasutaviṣṇuraghunāthanī-lakaṇṭhanarasiṃhaputrapautrādipaṭhanārtham śrīnīlakaṇṭhasva-hastena liṣitaṃ/ karaṇakutūhale aharganāṃtaram 16096//. It was copied, then, at Jīrṇadurga (Jūnagāḍh), by Nīlakaṇṭha, the son of Vidyādhara of the Girinārāyaṇajñāti, for himself, his brothers Viṣṇu, Raghunātha, and Narasiṃha and their descendents; the copying was finished on Monday 25, March 1555. The epoch of

the *Karaṇakutūhala* was 23 February, 1183 (see *SATIUS*, pp. 36a–37a); 16,096 (= 4 × 4,016) days later is 20 March, 1227, the epoch of the *Laghukhecarasiddhi.*

Ff. 1v–4v. *Laghukhecarasiddhi* composed by Śrīdhara in Śaka 1149 = A.D. 1227.
F. 5r. Tables 1 to 4 of the *Laghukhecarasiddhi.*
F. 5v. Tables 5 to 8 of the *Laghukhecarasiddhi.*
F. 6r. Tables 9 to 12 of the *Laghukhecarasiddhi.*
F. 6v. Tables 13 to 16 of the *Laghukhecarasiddhi.*
F. 7r. Tables 17 to 18 of the *Laghukhecarasiddhi.*
F. 7v. Tables 19 to 20 of the *Laghukhecarasiddhi.*
F. 8r. Tables 21 to 22 of the *Laghukhecarasiddhi.*
Ff. 8v–9r. Table 23 of the *Laghukhecarasiddhi.*
F. 9v. Blank.

2408c (Eggeling 2903). No. 213 in the Gaikawar's collection. 10ff.

Ff. 1r–10v. A fragment of the *Golasiddhāntacintāmaṇi* composed by Saḍānanda.
India Office 2464. Six manuscripts bound together. Presented by the Gaikawar on 29 September, 1809.

2466a (Eggeling 2941). No 213 (!) of the Gaikawar's collection. 28ff.

Ff. 1v–3v. *Kalpalatā.*
F. 4r. Table 1 of the *Kalpalatā.*
Ff. 4v–11v. Table 2 of the *Kalpalatā.*
F. 12r. Table 3 of the *Kalpalatā.*
Ff. 12v–19v. Table 4 of the *Kalpalatā.*
F. 20r. Table 5 of the *Kalpalatā.*
Ff. 20v–27v. Table 6 of the *Kalpalatā.*
F. 28r. Tables 7 to 8 of the *Kalpalatā.*
F. 28v. Tables 9 to 11 of the *Kalpalatā.*

2464b (Eggeling 2922) No. 214 of the Gaikawar's collection. 5ff. On f. 5v is written: saṃvat 1694 varṣe śā 1559 pra āṣāḍhavadi 13 some śrīgirīnārāyaṇājñātī bhaṭṭaśrīnārāyaṇasutanīlakaṇṭhena li° //. The copying was finished, then, on Monday 10, July 1637 Julian by Nīlakaṇṭha, the son of Nārāyaṇa Bhaṭṭa of the Girinārāyaṇajñāti.

F. 1r. A statement that the parameter of the lord of the year is 1;15,31,30 days.

F. 1r. A table of the rāmabījas equal to that in verses 23–25.

F. 1r. A verse:

> yugāny arkaṣaḍvedapūrṇābhdicandre
> taducce kudikpūrṇavedenduvahniḥ /
> khanandendubhūnetravadāgni pāte
> guṇā bhādikā madhyamāḥ sauravarṣe // 1 //

F. 1r. A table of yearly parameters and epoch positions.

	Guṇakāḥ	Sabījakṣepakāḥ
Lord of year	11;3,53,22,39 tithis	4;57,42,0 tithis
Moon	2;12;46,40,31°	59;32,27°
Lunar apogee	40;40,30,44°	3,44;31,7°
Lunar node	-19;21,33,55°	-21;7,33°

Ff. 1v–5v. *Grahajñāna* composed by Āśādhara in Śaka 1054—A.D. 1132.

2464c (Eggeling 2923). No. 214 (!) of the Gaikawar's collection. Ff. 1 and 3–6. On f. 6v is written: girinārāyaṇāḥ jñātīyaḥ // josī śrīvidyādhraḥ// putra-pautrapaṭhanārthaṃ. It was copied, then, by the astrologer Vidyādhara of the Girinārāyaṇājñāti, probably in ca. A.D. 1640.

F. 1v. Table 1 of the *Grahajñāna.*
F. 2. Missing.
F. 3r. Table 2 of the *Grahajñāna.*
F. 3v. Table 3 of the *Grahajñāna.*
F. 4r. Table 4 of the *Grahajñāna.*
F. 4v. Table 5 of the *Grahajñāna.*
F. 5r. Table 6 of the *Grahajñāna.*
F. 5v. Blank.
F. <6>r. Table 7 of the *Grahajñāna.*
F. <6>v. Table 8 of the *Grahajñāna.*

2464d (Egeling 2949). No. 215 of the Gaikawar's collection. 7ff. Ff. 1v–7v. *Laghukaraṇa* composed by Bhāvā Sadāśiva Bhaṭṭa in Śaka 1520 = A.D. 1598.

F. 1v. Table of epoch longitudes and mean daily motions; the former indicate that the epoch is 26 March 1598.

	mean sidereal longitudes		true tropical longitudes	differences
Sun	356;27,42°		15°	−19°
Moon	356;7,42		13	−17
Lunar apogee	98;33,50			
Lunar node	-43;3,11		−24-;48	−18
Mars	117;59,0		103	+15
Mercury's conj.	234;1,3	(Mercury)	348	—
Jupiter	62;18,50		73	−11
Venus' conj.	159;32,5	(Venus)	55	—
Saturn	153;33,0		179	−25

The mean daily motions, in minutes and seconds, are:

Sun	59,8	Mercury's conj.	245,32
Moon	790,35	Jupiter	5,0
Lunar apogee	6,41	Venus' conj.	96,8
Lunar node	−3;11	Saturn	2,0
Mars	31,26		

2464e (Eggeling 3040). No. 203 of the Gaikawar's collection. 33ff. On f. 33r is written: saṃvat 1838 varṣe māse māghakṛṣṇāṣṭamī dine saṃpūrṇaṃ paṃḍyā durlabharāma paṭhanārthaṃ // The copying was finished for (and by?) Durlabharāma on 26 January, 1781 Julian.

Ff. 1v–33r. *Yuddhajayārṇavatantra.*
F. 33v. Picture and diagram.

246f. (Eggeling 2880). 82ff. On f. 82r is written: saṃvat 1634 varṣe māghamāse kṛṣṇapakṣe saptamyāṃ tithau budhavāsare śrīmūlasaṃghe sarasvatīgacche balātkāragaṇe / śrīkuṃdakuṃdācāryānvaye bhaṭṭārakaśrīsumatikīrttidevās tacchiṣyabrahmaśāmalapaṭhanārthaṃ śrījaladurgavāstavyaśrīhuṃbajñātīya uttareśvaragotre śreṣṭhaśrīsaravaṇabhāryāvaijalade suta śreṣṭhaśrīsaratāṇabhāryāsobhāgade dvi° ratnāde tṛtī° suhāgade suta dhanarājabhāryādhanāde bhrātṛgadā ete svajñānāvaraṇīkarmakṣayārthaṃ likhāpi dattaṃ//.

The copying was finished, then, on Wednesday 28 January 1578 Julian for Brahmasamala, the pupil of Bhṭṭāraka Sumatikīrtideva of the (spiritual) lineage of Kundakundācārya in the Balātkāra gaṇa in the Sarasvatīgaccha of the Mūlasaṅgha. The donors belong to the Humbajñāti of the Uttareśvaragotra and live in Jaladurge (Jaldrug, Raichur, Hyderabad).

Ff. 1v–82r. *Gaṇitasārasaṅgraha* composed by Mahāvīra in ca. A.D. 850.

Indian Office 2476 (Eggeling 2954, 2955, and 2956). 62ff. Purchased
2476a (Eggeling 2954). 27ff.

F. 1r. In the right-hand margin is written: juz' awwal.
F. 1v Table 1 of the *Makaranda* for Śaka 1544 to 1784=A.D. 1622 to 1862.
F. 2r. Table 2 of the *Makaranda* for 1 to 16 years.
F. 2v. Table 3 of the *Makaranda* for 0 to 26 pakṣas.
Ff. 3r–4r. Table 4 of the *Makaranda* for 0 to 59 horizontal, and, in intervals of 6, for 0 to 54 vertical.
F. 4r. Table 5 of the *Makaranda* for Saka 1520 to 1832=A.D. 1598 to 1910.
F. 4v. Table 6 of the *Makaranda* for 1 to 24 years.
F. 5r. Table 7 of the *Makaranda* for 0 to 14 sidereal months.
Ff. 5v–6v. Table 8 of the *Makaranda* for 0 to 59 horizontal, and in intervals of 6, for 0 to 54 vertical.
F. 7r. Table 9 of the *Makaranda* for Śaka 1520 to 1836 (read 1832) =A.D. 1598 to 1910.
F. 7r. Table 10 of the *Makaranda* for 1 to 24 years.
F. 7v. Table 11 of the *Makaranda* for 0 to 14.
Ff. 8r–8v. Table 12 of the *Makaranda* for 0 to 42 horizontal, and, in intervals of 6, for 0 to 54 vertical.
F. 9r. Blank.
F. 9v. Table 12 of the *Makaranda* for 43 to 59 horizontal, and, in intervals of 6, for 0 to 54 vertical.
F. 10r. Table 14 of the *Makaranda* for 1 to 24 years.
F. 10r. Table 13 of the *Makaranda* for Śaka 1696 (read 1496) to 1688=A.D. 1574 to 1766.
F. 10v. Table 15 of the *Makaranda* for 1 to 12 zodiacal signs
Ff. 10v–11r. Table of the lengths of daylight measured in ghaṭikās for 0 to 59 units of which each represents 6° of solar progress; the

two places for which entries are given are Kāśī (Benares) and Kānyakubja (Kanauj). The maximum lengths of daylight are respectively for these places 34;5 and 34;18 when the Sun's longitude is 90°, the minimum lengths 25;55 and 25;22 (read 25;42) when it is 270°.
F. 11r. Table 16 of the *Makaranda* for 1 to 27 nakṣatras.
F. 11v. Blank.
Ff. 12r–12v. Table 17 of the *Makaranda* in three parts: part 1 is for Śaka 1400 to 1742=A.D. 1478 to 1820; part 2 is for 1 to 57 years; and part 3 is for 1 to 25 pakṣas.
Ff. 12v–13r. Table 18 of the *Makaranda*.
Ff. 13r–13v. Table 19 of the *Makaranda*.
Ff. 13v–14r. Table 20 of the *Makaranda*.
Ff. 14r–14v. Table 21 of the *Makaranda*.
Ff. 14v.–15r. Table 22 of the *Makaranda*.
Ff. 15r–15v. Table 23 of the *Makaranda*.
Ff. 15v–16r. Table 24 of the *Makaranda*.
Ff. 16r–16v. Table 25 of the *Makaranda*.
Ff. 16v–17r. Table 26 of the *Makaranda*.

Above tables 19 to 25 are listed the apogees and nodes of the planets, and their deśāntaras for Kāśī:

	Apogee	Node	Deśāntara
Moon	—	—	-0;10,32°
Lunar apogee	—	—	-0;0,5
Mars	—	—	-0;0,24
Mercury	220;27,45°	20;41°	-0;3,16
Jupiter	171;20,52	79;40	-0;0,5
Venus	79;51,23	49;41	-0;1,16
Saturn	266;37,34 (read 236;37,34)	100;21	-0;0,2

Ff. 17r–17v. Table 27 of the *Makaranda*. The solar apogee is placed at 77;17,6°.
F. 18r. Table 28 of the *Makaranda*.
F. 18v. Skeleton of a table; not filled in.
Ff. 19r–20r. Table 29 of the *Makaranda*. The apogee of Mars is placed at Leo 10;2,27°.

Ff. 20v–21v. Table 30 of the *Makaranda*. The apogee of Mercury is placed at Scorpio 10;27,57°.
Ff. 22r–23r. Table 31 of the *Makaranda*. The apogee of Jupiter is placed at Virgo 21;21,6°, the node at 79;40,23°.
Ff. 23v–24v. Table 32 of the *Makaranda*. The apogee of Venus is placed at 79;51,33°, the node at 49;40,57°.
Ff. 25r–26r. Table 33 of the *Makaranda*. The apogee of Saturn is placed at 236; 37, 54°.
F. 26v. Table of the śara (latitude) for an argument of 1 to 30 units of 6° (the bhujāṃśa); cf. table 4 of the *Karaṇakesarī* (*SATIUS*, pp. 70b–72b).

1	9;24	11	82;13	21	72;59
2	18;43	12	85;36	22	66;53
3	27;49	13	88;2	23	60;13
4	36;36	14	89;30	24	52;54
5	45;0	15	90;0	25	45;0
6	52;54	16	99;30 (read 89;30)	26	36;36
7	60;13	17	88;2	27	27;54
8	66;53	18	85;36	28	18;43
9	72;59	19	82;13	29	9;24
10	77;57	20	77;57	30	0;0

F. 26v. Table 51 of the *Makaranda*.
F. 26v. Table of unknown purport; the entries are stated to be in digits, and above the table are instructions for finding the parallax (avanati):

1	2;25	5	6;30	9	11;16
2	2;50	6	8;8	10	12;28
3	4;10	7	9;13	11	13;6
4	5;12	8	10;5	12	14;5

F. 26v. Table of half–durations of eclipses similar to table 47 of the *Makaranda*; the entries are stated to be in ghaṭīs:

1	0;40	5	2;16	9	2;41
2	1;36	6	2;25	10	2;42
3	1;59	7	2;32	11	2;45
4	2;4	8	2;37	12	2;48

F. 27r. Table 48 of the *Makaranda*.

F. 27r. Table 50 of the *Makaranda;* the explanation in *SATIUS* is wrong. There are four columns: the first gives the number of the zodiacal sign; the second the diameter of the disc of the Sun in digits (sūryabimba); the third an entity called the pātabimba or diameter of the disc of the node (?); and the fourth the daily progress of the Sun.

rāśitulya	sūryabimba	pātabimba	bhukti
1	10;46	0;22	0;58,45
2	10;35	0;31	0;57,46
3	10;27	0;37	0;56,57
4	10;26	0;37	0;56,57
5	10;33	0;31	0;57,38
6	10;44	0;22	0;58,34
7	10;57	0;14	0;59,12
8	11;8	0;5	1;0,53
9	11;14	0;1	1;1,28
10	11;15	0;0	1;1,22
11	11;8	0;5	1;0,15
12	10;58	0;53 (read 0;13)	0;59,18

F. 27r. Table of horizontal parallax measured in ghaṭīs. The argument is, in units of 6°, the distance between the nonagesimal and the Sun:

1=29	0;24,25	6=24	2;18,19	11=19	3;38,7
2=28	0;48,32	7=23	2;37,26	12=18	3;47,34
3=27	1;12,12	8=22	2;55,53	13=17	3;54,36
4=26	1;35,13	9=21	2;12,7 (read 3;12,7)	15=16	3;58,36
5=25	1;58,20	10=20	3;26,15	15=15	4;0,0

F. 27v. Table of the declination of the nonagesimal (tribhonakrānti) for 0° to 90°. This is a straightforward declination table; the entry for an argument of 90° is 24°.

2476b (Eggeling 2955). 24ff.

F. 1r. In the left-hand margin; juz' jihāram.

Ff. 1v–24r. *Makarandesyodāhṛti* composed by Viśvanātha in Śaka 1544 = A.D. 1622.

2476c (Eggeling 2956). 11ff.

F. 1r. In the left-hand margin: juz' tanqīm.
Ff. 1v–11r. *Makarandavivaraṇa* composed by Divākara in ca. 1650.
India Office 2529. Five manuscripts bound together. Presented by the Gaikawar on 29 September, 1809.

2529a (Eggeling 2925). No. 200 of the Gaikawar's collection. 8ff. On f. 8v is written: saṃvat 1765 varṣe mārgaśīrṣavadi 12 śanau vāsare svagurucaraṇāmbujareṇuvatga° tatvahaṃsasvavāṃcanāya samagurupraśādena lipīkṛtaṃ ātmārthaṃ //. The copying was finished, then, on Saturday, 27 November, 1708 Julian.

Ff. 1r–8v. *Karaṇakutūhala* composed by Bhāskara in Śāka 1105 =A.D. 1183.
F. 1r. Table of kṣepakas equivalent to those used in the *Brahmatulyasāriṇī* (see *SATIUS*, pp. 36a–37a).

2529b (Eggeling 2960). No. 221 of the Gaikawar's collection. 6ff. On f. 6v is written: saṃvat 1783 varṣe śāke 1648 pra° mārgaśīrṣavadi 8 seme (read saumye) bhaṭaśrī 5 prabhujī (suta in marg.) morārajīkena liṣtaṃ //. The copying was finished, then, on Wednesday 7, December 1726 Julian by Morārajīka, the son of Prabhujī Bhaṭa <of the Girinārāyaṇajñāti>.

Ff. 1v–6v. *Pañcāṅgavidyādharī* composed by Vidyādhara in Śaka 1565 = A.D. 1643.

2529c (Eggeling 3061). No. 216 of the Gaikawar's collection. 6ff. Ff. 1v–6v. *Maṇitthatājika.*

2529d (Eggeling 2768). No. 246 of the Gaikawar's collection. 27ff. On f. 27v is written: svasti śrīmannṛpavikramārkasamayāti saṃvat 1678 varṣe mārgaśīrṣavadī 7 saptamyāṃ tithau ravidine ////////// brahmasiddhāntapustakā likhitā //. The copying was finished then, on Sunday, 25 November, 1621 Julian.

Ff. 1v–27v. *Brāhmasphuṭasiddhānta* (including chapter 25) composed by Brahmagupta in Śaka 550 = A.D. 628.

2529e (Eggeling 2962). No. 217 of the Gaikawar's collection. The manuscript consists of two parts, each written by its own

scribe: A 8ff., which Eggeling believes to have been written by Morārajī, the son of Prabhujī; and B ff. 8–10, 10bis–13, 15, 14, and 16–22. On B f. 22r is written: li bhaṭa prabhujī jīvarā nī prati che // bhaṭa nānu nī pratya upare āprati laṣī che //. It was copied, then, by Prabhujī Bhaṭa <of the Girinārāyaṇajñāti> in ca. A.D. 1730 and belonged first to his son Jīvarāja and then to one Nānu Bhaṭa.

A ff. 1r–8v. *Tithikalpadruma* of Kalyāṇa (incomplete; it ends in the middle of verse 52).

F. 4r. Table of the rājas of the signs. This is table 5 of the Anonymous of 1594 (see *SATIUS*, pp. 54a–55a), table 8 of the *Pañcāṅgavidyādharī*.

B f. 8r. Tables 1 and 2 (of the *Tithikalpadruma*).

F. 8v. Tables 3 and 4 (of the *Tithikalpadruma*).

Ff. 9r–9v. Table 5 of the *Tithikalpadruma.*

F. 10r. Blank.

F. 10v. Tables 6 to 9 (of the *Tithikalpadruma*).

Ff. 10bis r–10bis v. Table 10 of the *Tithikalpadruma.*

F. 11r. Table 11 of the *Tithikalpadruma.*

F. 11v. Table 12 of the *Tithikalpadruma.*

F. 12r. Table 13 of the *Tithikalpadruma.*

F. 12v. Table 14 of the *Tithikalpadruma.*

F. 13r. Table 15 of the *Tithikalpadruma.*

F. 13v. Table 16 of the *Tithikalpadruma.*

F. 15r. Table 19 of the *Tithikalpadruma.*

F. 15v. Table 20 of the *Tithikalpadruma.*

F. 14r. Table 17 of the *Tithikalpadruma.*

F. 14v. Table 18 of the *Tithikalpadruma.*

Ff. 16r–17v. Table 21 of the *Tithikalpadruma.*

Ff. 18r–19v. Table 22 of the *Tithikalpadruma.*

Ff. 20r–21v. Table 23 of the *Tithikalpadruma.*

F. 22r. Tables 24 and 25 of the *Tithikalpadruma.*

F. 22v. A magic square:

3	10	2	7
6	3	7	6
9	4	8	1
4	5	5	8

India Office 2541. Five manuscripts bound together. Presented by the Gaikawar on 29 September, 1809.

2541a (Eggeling 2929). No. 263 of the Gaikawar's collection. 35ff. On f. 35v is written: saṃvat 1730 varṣe śāke 1595 pravartamāne uttarāyaṇe posamāse kṛṣṇapakṣe 5 tithau bhṛgujavāsare likhitaṃ śrīpattane paṃḍitottamaśrī 5 lāvaṇyarattajīśiṣyakuśalasāgareṇa likhitaṃ //. The copying was finished, then, on Friday 16, January 1674 Julian at Pattana (Patana, Gujarāt) by Kuśalasāgara, the pupil at Lāvaṇyaratnajī.

Ff. 1v–35v. *Udāharaṇa* to the *Brahmatulya* composed in about Saṃ. 1598/9, Śaka 1463/4 = A.D. 1541/2 for Rāya Rāyasiṃha, who was born, according to f. 1v, on: saṃvat 15 āṣāḍhādi 78 varṣe śāke 1443 pravarttamāne mārgaśīrṣavadi 9 śukre=Friday 22 November 1521 (?) Julian. Rāya Rāyasiṃha may be the Rāṭhoḍa prince who ruled Bīkāner from A.D. 1573 to 1612.

2541b (Eggeling 3058). No. 270 of the Gaikawar's collection. 20ff.

Ff. 1v–20v. Praveśaprakaraṇa in 417 verses from the *Tājikasāra* composed by Haribhaṭṭa.

2541c (Eggeling 3059). No. 264 of the Gaikawar's collection. 20ff.

Ff. 1v–20v. *Kārikā*, a ṭīkā on Haribhaṭṭa's *Tājikasāra*, composed by Sumatiharṣa in Saṃ. 1677=A.D. 1620.

2541d (Eggeling 3099). No. 266 of the Gaikawar's collection. 17ff.

Ff. 1v–17v. *Lagnacandrikā* composed by Kāśīnātha.

2541e (Eggeling 2948). No. — of the Gaikawar's collection. 2ff.

Ff. 1r–2v. *Candrārkīṭippaṇa* composed by Dinakara in ca. 1578.

India Office 2631 (Eggeling 2973). 84ff. On f. 84r. is written: śāke 1704 saṃvat 1839 pauṣamāse śuklapakṣe pūrṇimā śanivāsare dvivedi valabhadreṇa prālekhi patradīpakaṃ. The copying, then, was finished on Saturday 7 January 1783 Julian by Balabhadra Dvivedin, whom Eggeling wrongly assumes to be the author. The manuscript was received from Col. Mackenzie on 14 September, 1825; it then bore the number 82.

F. 1v. *Pattraprakāśa* composed by Viśrāmaśukla in Saṃ. 1834 = A.D. 1777.

F. 1v. Tables 1 to 3 of the *Pattraprakāśa.*
Ff. 2r–4r. Table 4 of the *Pattraprakāśa.*
F. 4v. Tables 5 to 7 of the *Pattraprakāśa.*
Ff. 5r–7r. Table 8 of the *Pattraprakāśa.*
F. 7v. Tables 9 to 11 of the *Pattraprakāśa.*
Ff. 8r–10r. Table 12 of the *Pattraprakāśa.*
Ff. 10v–11v. Explanatory text.
F. 10v. Tables 13 to 16 of the *Pattraprakāśa.*
F. 11r. Table 17 of the *Pattraprakāśa.*
F. 12r. Table 18 of the *Pattraprakāśa.*
Ff. 12r–12v. Table 19 of the *Pattraprakāśa.*
F. 13r. Table 20 of the *Pattraprakāśā.*
F. 13v. Table 21 of the *Pattraprakāśa.*
Ff. 14r–25v. Table 22 of the *Pattraprakāśa.*
Ff. 26r–37v. Table 23 of the *Pattraprakāśa.*
Ff. 38r–49v. Table 24 of the *Pattraprakāśa.*
Ff. 50r–61v. Table 25 of the *Pattraprakāśa.*
Ff. 62r–73v. Table 26 of the *Pattraprakāśa.*
Ff. 74r–74v. Table 27 of the *Pattraprakāśa.*
F. 74v. Table 28 of the *Pattraprakāśa.*
Ff. 75r–80v. Table 29 of the *Pattraprakāśa.*
Ff. 81r–81v. Table 30 of the *Pattraprakāśa.*
Ff. 82r–82v. Table 31 of the *Pattraprakāśa.*
Ff. 83r–84r. Table 32 of the *Pattraprakāśa.*
F. 84v. Blank.

India Office 2648 (Eggeling 2947). No. 209 of the Gaikawar's collection. A manuscript in four sections: A ff. 1–3; B f. 1; C ff. 1–12; D ff. 1–75. On A f. 3v in the upper margin is written: saṃvat 1683 varṣe śake 1559 (read 1549) pravarttamāne caitravadi aṣṭamī śukre likhitaṃ bhaṭṭaśrīnārāyaṇasutanīlakaṃṭhena. The copying was finished, then, on Friday 7 April 1626 Julian by Nīlakaṇṭha, the son of Nārāyaṇa Bhaṭṭa <of the Girinārāyaṇajñāti>. Presented by the Gaikawar on 29 September 1809.

A ff. 1r–3v. *Kheṭasiddhi* composed by Dinakara in 37 verses in Śaka 1500=A.D. 1578.

B. f. 1r. Table 1 (of the *Kheṭasiddhi*).
F. 1v. Tables 2 and 3 (of the *Kheṭasiddhi*).
C. f. 1r. Tables 4 and 5 of the *Kheṭasiddhi.*

F. 1v. Tables 6 and 7 of the *Khetasiddhi.*
F. 2r. Tables 8 and 9 of the *Khetasiddhi.*
F. 2v. Tables 10 and 11 of the *Khetasiddhi.*
F. 3r. Tables 12 and 13 of the *Khetasiddhi.*
F. 3v. Table 14 of the *Khetasiddhi.*
F. 3v. Tables 15 and 16 (of the *Khetasiddhi*).
F. 4r. Tables 17 and 18 (of the *Khetasiddhi*).
F. 4v. Tables 19 and 20 (of the *Khetasiddhi*).
F. 5r. Tables 21 and 22 of the *Khetasiddhi.*
F. 5v. Tables 23 and 24 of the *Khetasiddhi.*
F. 6r. Tables 25 and 26 of the *Khetasiddhi.*
F. 6v. Tables 27 and 28 of the *Khetasiddhi.*
F. 7r. Tables 29 to 32 of the *Khetasiddhi.*
F. 7v. Tables 33 to 36 of the *Khetasiddhi.*
F. 8r. Tables 37 to 39 of the *Khetasiddhi.*
F. 8v. Tables 40 and 41 of the *Khetasiddhi.*
F. 9r. Table 42 of the *Khetasiddhi.*
F. 9v. Tables 43 and 44 of the *Khetasiddhi.*
Ff. 10r–10v. Table 45 of the *Khetasiddhi.*
Ff. 10v–12r. Table 46 of the *Khetasiddhi.*
F. 12v. Tables 47 to 49 (of the *Khetasiddhi*).
D ff. 1r–15v. Table 50 of the *Khetasiddhi.*
Ff. 16r–30v. Table 51 of the *Khetasiddhi.*
Ff. 31r–45v. Table 52 of the *Khetasiddhi.*
Ff. 46r–60v. Table 53 of the *Khetasiddhi.*
Ff. 61r–75v. Table 54 of the *Khetasiddhi.*

India Office 2730 (Eggeling 2944). 8ff. On f. 6v. is written: śake 1729 prabhavavarṣe bhādrapadavidyatṛtīyāyāṃ śanau taddine vijaya-purasthataṃmaṇadaivajñaprapautrarāmajyotirvitputrapāṇḍuraṅ-gena likhitaṃ. The copying was finished, then, on Saturday 7 September 1807 Julian by Pāṇḍuraṅga, the son of Rāma Jyotirvid and the great grandson of Taṃmaṇa Daivajña, a resident of Vijayapura (Bijāpur). Received from Col. Mackenzie on 3 December 1833.

Ff. 1v–6v. *Rāmavinoda* composed by Rāmacandra in Śaka 1512 = A.D. 1590.

Ff. 7r–8r. Tables of rising-times in palas of the 12 zodiacal signs at Ujjananagara (Ujjain; its noon equinoctial shadow is given as

4;0; its carakhaṇḍas as 40 for 10, 32 for 20, and 130 (read 13) for 30; and its longitudinal difference as + 200); at Vijayapura (Bijāpur: its noon equinoctial shadow is given as 3;45; its carakhaṇḍas as 37 for 10, 30 for 20, and 10 for 30); at Baṃkāpura at Daulatābādanagara (Daulatabad: its noon equinoctial shadow is given as 4;20; its carakhaṇḍas as 43 for 10, 34 for 20, and 140 (read 14 for 30); and at Burhanapur (Burhanpur: its noon equinoctial shadow is given as 4;30).

	Ujjana-nagara	Vijaya-pura	Bamkā-pura	Daulatā-bāda	Burāna-pura
Aries Pisces	238	241	242	235	233
Taurus Aquarius	267	269	270	264	263
Gemini Capricorn	310	311	321 (312)	309	308
Cancer Sagittarius	336	335	335 (334)	337	338
Leo Scorpio	331	329	329 (328)	336 (334)	335
Virgo Libra	318	315	315 (314)	321	330 (323)
	1800	1800	1812 (1800)	1802 (1800)	1807 (1800)

F. 8r. A brief text on the prime meridian:

atha bhūrekhā //
laṅkātaḥ śarasūryayojanagatā kanyātha kāntī radaiḥ
svāmī khāṣṭamitair nakhais tu sagaro mallārir akṣendubhiḥ /
paryalp<ā>ṣṭabhir ubha(tta)ratra daśabhiḥ syād vatsagulmaṃ
puraṃ
khākṣair ujjayanīpuraṃ daśakubhi<s> tasmāt kurukṣetrakaṃ //
tasmān merur yojanais tatvanāgair
evaṃ bhūmer madhyarekhā niruktā //
bhūvyāsayojanāni 1385.

The distances from Laṅkā are: 125;32 yojanas to Kāntī (=Kāñcī? Conjeevaram); 80;20 yojanas to Svāmī Sagara (?); 15;8 yojanas to Mallāri (Mallar, Bilaspur, C. P. ?); 10 yojanas to Vatsagulma (Basim, Akola, Berar); 50 yojanas to Ujjayanī (Ujjain); 110 yojanas to Kurukṣetra; and 725 yojanas to Meru. A quadrant, then, is 1116 yojanas, and the earth's circumference 4464 yojanas. This is too high if the diameter of the earth is 1385 yojanas.

F. 8v. Blank.

India Office 3653c (Keith 6323). 46ff. Śāradā script. This manuscript is very badly damaged.

Ff. 1r–2r. Table 1 of the <*Khaṇḍakhādyakasāriṇī*> for 112° to 180°.
Ff. 2r–4v. Table 2 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 180°.
Ff. 4v–7r. Table 3 of the *Khaṇḍakhādyakasāriṇī*> for 1° to 90°.
Ff. 7r–10r. Table 4 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 180°.
Ff. 10r–13r. Table 5 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 180°.
Ff. 13r–14r. Table 6 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 90°.
Ff. 14v–17v. Table 7 of the <*Khaṇḍakhādyakasāriṇī*> for 1 to 365 days.
Ff. 17v–42v. Table 8 of the <*Khaṇḍakhādyakasāriṇī*> for 1 to 3031 days.
Ff. 42v–43v. Table 9 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 90°.
Ff. 43v–45r. Table 10 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 90°.
Ff. 45r–45v. Table 11 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 90°.
Ff 45v–46r. Table 12 of the <*Khaṇḍakhādyakasāriṇī*> for 1° to 90°.

India Office Burnell 287–288 (Keith 6303). 116 and 133 pp. Grantha script.

Copied after 1861.
287. Pp. 1–8. Text.

Pp. 9–12. Table 1 of the <*Grahasāriṇī*>.
Pp. 13–16. Table 2 of the <*Grahasāriṇī*>.
Pp. 17–20. Table 3 to the <*Grahasāriṇī*>.
Pp. 21–24. Table 4 of the <*Grahasāriṇī*>.
Pp. 25–28. Table 5 of the <*Grahasāriṇī*>.
Pp. 29–32. Table 6 of the <*Grahasāriṇī*>.
Pp. 33–36. Table 7 of the <*Grahasāriṇī*>.
Pp. 37–40. Table 8 of the <*Grahasāriṇī*>.
Pp. 41–44. Table 9 of the <*Grahasāriṇī*>.
Pp. 45–48. Table 10 of the <*Grahasāriṇī*>.
Pp. 49–52. Table 11 of the <*Grahasāriṇī*>.
Pp. 53–56. Table 12 of the <*Grahasāriṇī*>.
Pp. 57–58 Table 13 of the <*Grahasāriṇī*>.

Pp. 59–60. Table 14 of the <*Grahasāriṇī*>.
Pp. 61–63. Text.
P. 64. Blank.
Pp. 65–68. Table 15 of the <*Grahasāriṇī*>.
Pp. 101–102. Table 24 of the <*Grahasāriṇī*>.
Pp. 103–104. Table 25 of the <*Grahasāriṇī*>.
Pp. 105–106. Table 26 of the <*Grahasāriṇī*>.
Pp. 107–108. Table 27 of the <*Grahasāriṇī*>.
Pp. 109–112. Table 28 of the <*Grahasāriṇī*>.
Pp. 69–72. Table 16 of the <*Grahasāriṇī*>.
Pp. 73–76. Table 17 of the <*Grahasāriṇī*>.
Pp. 77–80. Table 18 of the <*Grahasāriṇī*>.
Pp. 81–84. Table 19 of the <*Grahasāriṇī*>.
Pp. 85–88. Table 20 of the <*Grahasāriṇī*>.
Pp. 89–92. Table 21 of the <*Grahasāriṇī*>.
Pp. 93–96. Table 22 of the <*Grahasāriṇī*>.
Pp. 97–100. Table 23 of the <*Grahasāriṇī*>.
Pp. 113–116. Blank.

288. Pp 1–133. Text.

India Office Mackenzie II 48. Four manuscripts bound together.

Received from Col. Mackenzie on 11 September 1825.

II 48a (Keith 6408). 6ff.

Ff. 1–6. *Jātakapaddhati* composed by Keśava in ca. A.D. 1500 with the commentary composed by Viśvanātha in Śaka 1540=A.D. 1618.

II 48b (Keith 6446). Ff. 553–557.

Ff. 553–557. *Samarasāra* composed by Rāmacandra in ca. A.D. 1450 with the commentary composed by Bharata in ca. A.D. 1450.

II 48c (Keith 6296). 25ff.

Ff. 1–25. *Makarandasyodāharaṇa* composed by Viśvanātha in Śaka 1544 = A.D. 1622.

II 48d (Keith 6446). 9ff.

Ff. 1–9. *Samarasāraṭīkā* composed by Bharata in ca. A D. 1450.
Oxford Chandra Shumshere c. 319. Two manuscripts bound together.

CS c. 319a (3301). 48ff.

Ff. 1–48. *Nīlakaṇṭhītājakaṭīkā* composed by Viśvanātha in Śaka 1551=A.D. 1629.
Incomplete.

CS c. 319b (3347). A manuscript in 3 parts: A 3ff.; B 22ff.; and C 1f. On A f. 3r is written: śake 1560 bahudhānyanāmasaṃvachare māhāmāṅgalypradamāghamāse yadi śuklapakṣe dvādaśi ghaṭī 10 pale 25 punarvasunakṣatra gha 15 āyuṣmāyoga ghaṭīkā 10 pale 35 bālavakaraṇa ghaṭīkā 10 pa 25 karkasthīte candre kumbhasthī sūrye vṛścīkasthite devaguru kṛ<ṣṇa>bhaṭṭasya sutena māhodeva-bhaṭṭa āüṭī janārdaṇasapena līkhyate. The copying of A, then, was finished by Janārdana, the son of Kṛṣṇabhaṭṭa and a devotee (?) of Mahādeva, on 5 February 1639 Julian. On B f. 22v is written: śake 1560 bahudhānyanāmasaṃvatsare udagayane śīsīratau māhāmāṅgalyapradamāghamāse śuklapakṣe pañcamī ghaṭī 19 pala 45 nakṣatrarevatī mīnasthite candre <kumbha>sthīte sūrye vṛścīkasthīte de<vagu>ru bhomavāsare kṛsnabhaṭṭasya sutena māhādevabhaṭṭa āḍaṭī <bha>gavatidāsa janārdena bhaṭena na likhyate. The copying of B, then, was finished by Bhgavatīdāsa Janārdana Bhaṭṭa, the son of Kṛṣṇabhaṭṭa and a devotee (?) of Mahādeva, on Tuesday 29 January 1639 Julian. On C f. 1v is written: śaka 1560 bahudhānyanāmasaṃvachare udagayane śisīratau māhāmāṅgalyapradamā<gha>māse yadi śuklapakṣe dvādasī nakṣatrapunarvasu karkasthite candre kumbhasthite sūrye vṛścīkasthite devaguru kṛsnabhaṭasya sutena māhādevabhaṭṭa āṃḍavī bhagavatidāsena likhyate. The copying of C, then, was finished by Bhagavatīdāsa <Janārdana>, the son of Kṛṣṇabhaṭṭa and a devotee (?) of Mahādeva, on 5 February 1639 Julian, as was also that of A. On C f. 1v in the bottom margin is a note of ownership: idaṃ pustaṃ jyotirvit bhāskarasya.

A f. 1r. Text in 9 verses on puṣpamālā.
Ff. 1v–3r. *Śīghrasiddhi* composed by Lakṣmīdhara in Śaka 1200 = A.D. 1278.
B ff. 1r–1v. Table 1 of the *Śīghrasiddhi*.
Ff. 2r–2v. Table 4 of the *Śīghrasiddhi*.
Ff. 3r–7v. Table 7 of the *Śīghrasiddhi*.
Ff. 8r–8v. Table 2 of the *Śīghrasiddhi*.
Ff. 9r–9v. Table 5 of the *Śīghrasiddhi*.

Ff. 10r–14v. Table 8 of the *Śīghrasiddhi.*
Ff. 15r–15v. Table 3 of the *Śīghrasiddhi.*
Ff. 16r–16v. Table 6 of the *Śīghrasiddhi.*
Ff. 17r–21v. Table 9 of the *Śīghrasiddhi.*
F. 22r. Table 11 of the *Śīghrasiddhi.*
F. 22v. Table 12 of the *Śīghrasiddhi.*
F. 22v. Table 14 (of the *Śīghrasiddhi*).

C ff. 1r–1v. Addition by Janārdana to the *Śīghrasiddhi* of Lakṣmīdhara; in 12 verses.

The epoch is Śaka 1550 (read 1540) = A.D. 1618; cf. table 14 (of the *Śīghrasiddhi*).

Oxford Chandra Shumshere d. 774. Eight manuscripts bound together.

CS d. 774a (3158). 3ff. On f. 3v is written: li rāmajī vyāsamī māghavadi 14 saṃ 1874. The copying was completed, then, on 22 February 1818 Julian by Rāmajī Vyāsamī.

Ff. 1–3. *Śukajātaka.*

CS d. 774b (3165). 29ff. On f. 29v is written: svasti śrīmannṛpavikramārkarājyasamayāt saṃvat 1840 varṣe śrīmachālivāhanakratyaśāke 1705 pravarttamāne uttarāyanagate śrīsūrye māhāmaṅgalyaprade māsottamamāse śubhakāri āṣāḍhamāse śuklapakṣe 13 tṛyodaśī tithau mandavāsare likhitaṃm idaṃ tājikabhūṣaṇaṃ pātagāme madhāvādavāstavaṃ vīsanagarājñātiyapaṃdyā jīvanakasya putra prabhurāmeṇa likhitaṃm idaṃ ātmapaṭhanārthaṃ. The copying was finished, then, on Saturday 1 July 1783 Julian at Pātagāma (Patan, Baroda?) by Prabhurāma, the son of Jīvanaka, of the Viśanagarajñāti residing at Madhāvāda (Madhavpur, Kathiawar, W.I.).

Ff. 1–29. *Tājikabhūṣaṇa* composed by Gaṇeśa in ca. A.D. 1620.

CS d. 774c (3166). 26ff. On f. 26v is written: śrīśake 1714 (read 1718) śrīsaṃvat 1853 mīti jeṭhasudi terodaśivāsare kāśyāṃ śrīharṣadevajyotirvidāṃ pustakaṃ likhitaṃ. The copying was finished, then, on 7 May 1796 Julian at Kāśī (Benares) by Harṣadeva.

Ff. 1–26. *Yantracintāmaṇi* composed by Cakradhara with the *Yantracintāmaṇiṭīkā* composed by Rāma in Śaka 1547 = A.D. 1625.

CS d. 774d (3167). 26ff. On f. 26v is written: śake 1554 vṛṣasaṃvatsare (A.D. 1632 was a vṛṣasaṃvatsara) ... saṃvat 1791 vihārāmaduvekı pustakī. Did the manuscript belong to Vihārāmaduveka in A.D. 1734?

Ff. 1-26. *Balabodha* composed by Munjaditya.

Cs d. 774e (3168), 57ff. On f. 57v is written: mārgaśirṣe pramodābde bhūtāyaṃ budhavāsare lilekha ṭhākuro nāmāhyatprabhṛtyo dvijānugaḥ saṃ 1856 nandikiśorayugalakiśorakṛṣṇakiśorānām paṭhanārtham. The copying was finished, then, on Wednesday 7 December (?) 1799 Julian by Ṭhākura for Nandi Kiśora, Yugala Kiśora, and Kṛṣṇa Kiśora.

Ff. 1-57. *Muhūrtakalpadruma* composed by Viṭṭhala Dīkṣita in Śaka 1548=A.D. 1626.

CS d. 774f. (3169). 25ff. On f. 25v is written: śrīsamvat 1891 pauṣakṛṣṇaḥ amāvasya bhaumavāsare. The copying was finished, then, on Tuesday 15 January 1835 Julian.

Ff. 1-25. *Grahalāghava* composed by Gaṇeśa in Śaka 1442=A.D. 1520.

CS d. 774g (3170). Ff. 1-8, 10-14, 9, and 2bis.

F. 1v. Table 1 of the *Grahalāghavasariṇi* I; the dhruvāṅkas are 1 to 34.

F. 2r. Table 2 of the *Grahalāghavasariṇi* I; the dhruvāṅkas are 1 to 31.

F. 2v. Table 3 of the *Grahalāghavasāriṇī* I; the dhruvāṅkas are 1 to 30.

F. 3r. Table 4 of the *Grahalāghavasariṇī* I; the dhruvāṅkas are 1 to 30.

F. 3v. Table 5 of the *Grahalāghavasāriṇi* I; the dhruvāṅkas are 1 to 31.

F. 4r. Table 6 of the *Grahalāghavasāriṇī* I; the dhruvāṅkas are 1 to 30.

F. 4v. Table 7 of the *Grahalāghavasāriṇī* I; the dhruvāṅkas are 1 to 31.

F. 5r. Table 8 of the *Grahalāghavasāraṇī* I; the dhruvāṅkas are 1 to 31.

F. 5v. Table 9 of the *Grahalāghavasāriṇi* I; the dhruvāṅkas are 1 to 30.

F. 6r. Table of the mean motion of the lunar apogee according to the Brāhmapakṣa, set up as are tables 1 to 9; the dhruvāṅkas are 1 to 32. The motion for 4,000 days is 2^s 25;26,28,14°, which implies a mean daily motion of 0;6,40,53,48, . . . °.

F. 6v. Table of the mean motion of the Sun for 1 to 52 avadhis according to the Saurapakṣa. The motion for 51 avadhis is 11^s 21;51,37,12°, which implies a mean daily motion of 0;58,8,10,17, . . . °.
F. 6v. Table of the mean motion of the lunar anomaly for 1 to 10 years. The motion in 1 year is 1,32;14,4,1°.

Ff. 7r–7v. Table 10 of the *Grahalāghavasāriṇī* I.
Ff. 7v–8r. Table 11 of the *Grahalāghavasāriṇī* I.
Ff. 8v–9r. Table 17 of the *Grahalāghavasāriṇī* I.
F. 9v. Table 12 of the *Grahalāghavasāriṇī* I.
Ff. 9v–10v. Table 18 of the *Grahalāghavasāriṇī* I.
F. 10v. Table 13 of the *Grahalāghavasāriṇī* I.
Ff. 11r–11v. Table 19 of the *Grahalāghavasāriṇī* I.
Ff. 11v–12r. Table 14 of the *Grahalāghavasāriṇī* I.
Ff. 2r–13r. Table 20 of the *Grahalāghavasāriṇī* I.
Ff. 13r–13v. Table 15 of the *Grahalāghavasāriṇī* I.
Ff. 13v–14r. Table 21 of the *Grahalāghavasāriṇī* I.
F. 14v. Table 16 of the *Grahalaghavasāriṇī* I.
F. 2bis r. Table 2 of the *Grahalāghavasāriṇī* I.
F. 2bis v. Table 3 of the *Grahalāghavasāriṇī* I.

CS d. 774h (3178). 55ff.

Ff. 1–55. *Pañcāṅgapāṭī.*
Oxford Chandra Shumshere d. 776. Ten manuscripts bound together.

CS d. 776a (3211). 21ff.

Ff. 1–21. *Pañcasvarā* composed by Prajāpatidāsa with the vṛtti written by Appa Dīkṣta (see Appaya Dīkṣita in *CESS* A I).

CS d. 776b (3213). 13ff. On f. 13v. is written: saṃvat 1919. This is A.D. 1862/3.

F. 1–13. *Pañcasvarānirṇaya* composed by Prajāpatidāsa.

CS d. 776c (3212). 5ff. On f, 5v is written: saṃvat 1903 caitraśukla 14, Sana 1253. This is 28 March 1846 Julian.

Ff. 1–5. *Gaurījātaka.*

CS d. 776d. (3214). 7ff.

Ff. 1–7. *Keśavījātaka* composed by Keśava in ca. A.D. 1500 with the ṭīkā composed by Viśvanātha in ca. A.D. 1630 through the mitrāmitrādhyāya.

CS d. 776e. (3215). 30ff. On f. 30v is written: saṃ 1733 śrāvaṇaśukla 3 budhe likhitam idaṃ jyotirviccintāmaṇinā //. The copying was finished, then, by Cintāmaṇi on Wednesday 2 August 1676 Julian.

Ff. 1–30. *Keśavījātakaṭīkā* composed by Keśinātha.

CS d. 776f. (3216). 37ff. On f. 37v is written: saṃvat 1873 māsotme māse pauṣe māse kṛṣṇe pakṣe tithau 3 tadine pusta likhyataṃ. The copying was finished, then, on 25 December 1816 Julian.

Ff. 1–37. *Lagnacandrikā* composed by Kāśinātha.

CS d. 776g. (3217). 4ff. On f. 4v is written: saṃvat 1760 varṣe āṣāḍhavadi 8 gurau. The copying was finished, then, on Thursday 24 June 1703 Julian.

Ff. 1v–4v. *Rāmavinoda* composed by Rāmacandra in Śaka 1512 = A.D. 1590.

F. 3r. Table 1 of the *Rāmavinoda.*

F. 4r. Table 2 of the *Rāmavinoda.*

CS d. 776h. (3218). 22ff.

Ff. 1–22. *Grahalāghava* composed by Gaṇeśa in Śaka 1442=A.D. 1520.

CS d. 776i (3219). 7ff.

Ff. 1–7. *Hillāja* with a ṭīkā.

CS d. 776j (3220). 57ff.

Ff. 1–57. *Golādhyāya* of Bhāskara's *Siddhāntaśiromaṇi* with his own *Vāsanābhāṣya,* both composed in ca. A.D. 1150. Incomplete. Oxford Chandra Shumshere f. 51. Two manuscripts bound together.

CS f. 51a (3281). 8ff.

Ff. 1r–2v. *Pañcāṅgānayanasāraṇī* in 17 verses.
F. 3r. Tables 1 to 8 of the *Pañcāṅgīnayanasāraṇī*.
F. 3v. Table 9 of the *Pañcāṅgīnayanasāraṇī*.
F. 4r. Table 10 of the *Pañcāṅgīnayanasāraṇī*.
F. 4v. Table 11 of the *Pañcāṅgīnayanasāraṇī*.
F. 5r. Table 12 of the *Pañcāṅgīnayanasāraṇī*.
F. 5v. Table 13 of the *Pañcāṅgīnayanasāraṇī*.
F. 6r. Tables 14 to 16 of the *Pañcāṅgīnayanasāraṇī*.
F. 6v. Tables 17 to 20 of the *Pañcāṅgīnayanasāraṇī*.
Ff. 7r–7v. Table 21 of the *Pañcāṅgīnayanasāraṇī*.
F. 8r. Table 22 of the *Pañcāṅgīnayanasāraṇī*.
F. 8v. Blank.

CS f. 51b (——). Ff. 1–10 and 1 f.

Ff. 1–11. *Rāśicakra*.

Oxford Chandra Shumshere f. 53 (3070). 3ff. On f. 3v is written: saṃvat 1900=A.D. 1843/44.

Ff. 1r–3v. The *Grahaṇamālāsāraṇī*, a list of solar and lunar eclipses from Śaka 1765 to 1831=A.D. 1843 to 1909. The information provided for each is: Śaka year, month, tithi, week-day, half duration, first contact, last contact, directions of deflection, and body illuminated. For example, the first three entries and their Oppolzer numbers are:

(1) śrīśa 1765 mārgaśīrṣa 15 budhe / sthi 2;29 spa 56;7 (read 46;7) ma 51;55 yāmya caṃ. This is the lunar eclipse (Oppolzer 4720) of 7 December 1843 Gregorian (Wednesday 6 December according to sunrise epoch), whose half duration was 51 minutes= 2;7,30 ghaṭikās.

(2) śa 1765 pauṣī 30 gurau sthi 2;57 spa 7;44 mo 13;38 yāmyaśara sūryyaparva. This is a solar eclipse that does not appear in Oppolzer's canon. The date is Thursday 18 January 1844 Gregorian.

(3) śake 1766 jyeṣṭī 15 śani sthi 4;26 spa 56;56 mo 62;48 saumyaśa caṃ pa. This is the lunar eclipse (Oppolzer 4721) of 31 May 1844 Gregorian (Saturday 1 June according to sunrise epoch), whose half duration was 107 minutes=4;27,30 ghaṭikās.

Oxford Chandra Shumshere g. 17. Ff. 1–58, 60, 59, and 61–118.

Ff. 1r–1v. A part of the *Rāmavinoda* composed by Rāmacandra in Śaka 1512=A.D. 1590, beginning at I 2; the colophon calls it *Rāmavinodavivaraṇa.*

F. 1v. Table 2 of the *Rāmavinoda.*
F. 2r. The end of table 8 of the *Makaranda* for 54 to 59 horizontal, and, in intervals of 6, for 0 to 54 vertical.
F. 2r. Table 9 of the *Makaranda* for Śaka 1568 to 1664=A.D. 1646 to 1742.
F. 2r Table 10 of the *Makaranda* for 1 to 24 years.
F. 2v. Table 11 of the *Makaranda* for 0 to 14.
Ff. 2v–4r. Table 12 of the *Makaranda* for 0 to 59 horizontal, and, in intervals of 6, for 0 to 54 vertical.
F. 4v Table 13 of the *Makaranda* for Śaka 1544 to 1712=A.D. 1622 to 1790.
F. 4v. Table 14 of the *Makaranda* for 1 to 24 years.
F. 4v. Table 15 of the *Makaranda* for 1 to 12 zodiacal signs.
F. 5r. Table 16 of the *Makaranda* for 1 to 27 nakṣatras.
Ff. 5r–5v. Table of the length of daylight for 1 to 52 weeks. The maximum length of daylight is 34;1 ghaṭikās at week 12, the minimum 25;57 at week 38.
F. 5v. Table of the sum of the half equation of daylight and of the equation of time (traikyaghaṭī) for 1 to 52 weeks. The maximum is + 1:59 at week 11, the minimum —2;15 at week 42.
Ff. 6r–6v. Table 17 of the *Makaranda* in two parts: part 1 is for Śaka 1514 to 1742=A.D. 1592 to 1820 (a later hand has added on f. 5v the entries for Śaka 1400 and 1457=A.D. 1478 and 1535); and part 2 is for 1 to 57 years.
Ff. 7r–7v. Table 18 of the *Makaranda.*
Ff. 8r–8v. Table 19 of the *Makaranda.*
Ff. 9r–9v. Table 20 of the *Makaranda.*
Ff. 10r–10v. Table 21 of the *Makaranda.*

In the tables of true longitudes of the planets each set contains 0 to 59 tables, of which each is for 1 to 52 weeks; cf. tables 22 to 26 of the *Pattraprakāśa.* The mean longitude of Mars, then, increases by 6° from table to table. True longitudes and daily progresses are given; the Greek-letter phenomena are noted in the margin for Mars only. These are probably the true longitude tables of the *Rāmavinoda.*

Ff. 11r–29v. True longitude tables of Mars for N=3 to 59.
Ff. 30r–49v. True longitude tables of Mercury for N=0 to 59.
Ff. 50r–69v. True longitude tables of Jupiter for N=0 to 59.
Ff. 70r–80v. True longitude tables of Venus for N=0 to 59.
Ff. 90r–108v. True longitude tables of Saturn for N=0 to 59.
Ff. 109r–109v. Geographical table listing localities and the lengths in digits of their noon equinoctial shadows; cf. *SATIUS*, pp. 73a–75b. Localities 1 to 4 are in the margin of f. 109r; localities 5 to 48 on f. 109r; localities 49 to 54 in the margin of f. 109v; and localities 55 to 92. on f. 109v. In the following list, the serial numbers are first given; then, where applicable, the serial number in parentheses of the same locality in the geographical table published in *SATIUS;* the text spelling of the locality follows with the noon equinoctial shadow; and finally the name of the locality according to the *Imperial Gazetteer of India*, vol. 26, rev. ed., Oxford 1931, with the approximate latitude North. The absence of any port dealing with European traders apart from Cambay and the absence of Poona indicate that the list probably dates from the sixteenth or early seventeenth century; the many errors in the shadow-lengths (which I have not here attempted to correct) indicate that this is a later copy of the original list.

1 (115)	bhelasā	5;45	Bhilsa, Gwalior	23;30°
2 (94)	naravara	5;55	Narwar, Gwalior	25;40
3	oḍase	5;20	Orisa, Sirohi, Rajputana	24;40
4	mālapura	6;0	Malpura, Jaipur, Rajputana	26;20
5 (88)	damaṇa	5;45	Daman, Portuguese India	20;30
6 (83)	dvārāvati	6;5	Dwarka, Baroda	22;20
7	ṭhaṭā	6;6	Tatta, Karachi, Bombay	24;50
8	rāmanagara	5;0	Ramnagar, Mandla, C.P.	22;40
9	mabūnagara	5;25	Mahbubnager, Hyderabad (?)	16;40
10	māṃgalora	5;1	Mangalore, South Kanara, Madras	12;50
11	dīva	5	Diu, Portuguese India	20;40
12	māhoda	5	Modasa, Ahmadabad, Bombay	23;30
13 (37)	jūnāgaḍha	5;20	Junagarh, Kathiawar, W.I.	21;30
14	halavada	5;20	Halvad, Kathiawar, W.I.	23;0
15 (30)	gujarātha	5;20	Gujarāt	
16 (121)	vairāṭe	6;27	Bairat, Jaipur, Rajputana	27;30
17	lāpalolāṇū	5;10		
18	nagaraḍhaṭṭhā	6;6	Datha, Kathiawar, W.I.	21;10
19 (85)	devagaḍha (cf. 38)	4;4	Deogarh, Jhansi, U.P.	24;30
20 (106)	pauṇī	4;30	Pauni, Bhandara, C.P.	20;50

21	alvakapattana	5;1		
22	durgāvatī-gaḍha	4;6	Drug, C.P.	21;10
23	dhāṃdhava-gaḍha	5;52	Dhandhuka, Ahmadabad, Bombay	22;20
24 (42)	dīllī	6;3	Delhi, Punjab	28;40
25 (126)	mathurā	6;14	Muttra, U.P.	27;40
26	cāṃdā		Chanda, C.P.	20;0
27 (151)	sūrata	4;45	Surat, Bombay	21;10
28	ratanapura	5;52	Ratanpur, Rewa Kanth, Bombay	21;50
29	kapaḍavāna	4;59	Kapadvanj, Khaira, Bombay	23;10
30	khaṃbhāīta	4;59	Cambay, Bombay	22;20
31 (36)	jaṃbūsara	4;59	Jambusar, Baroda	22;0
32 (13)	kāpilā (cf. 74, 82)	4;54	Rummindei, Nepal	
33 (47)	gaṃdhāra (cf. 59)	4;52	(?) Kandahar, Nander, Hyderabad	18;50
34	navasārī	5;4	Navsari, Baroda	21;0
35	ghaṇadīvī	5;47		
36	valasāḍa	4;38	Vadsar, Baroda	23;20
37	bālāpura	4;25	Vala, Kathiawar, W.I.	21;50
38 (85)	devagaḍha (cf. 19)	4;4	Deogarh, Jhansi, U.P.	24;30
39 (4)	ḍhākāṃ	6;20	Dhak, Shahpur, Punjab	32;30
40	māḍau	4;50	Mandvi, Cutch, W.I.	22;50
41 (110)	vurāṃlapura	4;30	Burhanpur, Nimar C.P.	21;20
42 (144)	śiroṃja	4;48	Sironj, Tonk, Rajputana	24;10
43 (150)	sāraṃgapura	4;53	Sarangpur, Dewas Junior, C.I.	23;40
44	revā narmadā	4;47	Revā – Narmadā River	
45	madhyadeśe	6;9		
46 (33)	caṃderī	6;0	Chanderi, Isagarh, Gwalior	24;40
47 (154)	hastanāpura	6;31	Merat, Meerut, U.P.	29;10
48	ruṭidvāra	6;36		
49	maḍato	5;45		
50	māṃdava-gaḍha	5;1	Mandu, Dhar, C.I.	22;20
51 (59, 157)	ajamera	5;50	Ajmer, Rajputana	26;30
52	gagarapura	5;3		
53	vāsavāla	5;10	Veraval, Kathiawar, W.I.	20;50
54	ucavāḍhā-gaḍha	5;3	Uch, Bahawalpur, Punjab	29;20
55	hājīpura	5;45	Hajipur, Muzaffarpur, B. and O.	25;40
56	khārūṃpāṭala	3;47		
57	ānāvāmū-paṭṭana	5;20		
58	machalī-paṭṭana	5;6	Machilpur, Karauli, Rajputana	26;30

59 (16)	khaṃdāra			
	(cf. 33)	8;0	Kandahar, Afghanistan	31;40
60 (155)	ayodhyā	6;7	Ajodhya, Fyzabad, U.P.	26;40
61	nāgapura	5;0	Nagpur, C.P.	21;10
62 (72)	jugaṃnāthe	4;24	Puri, B. and O.	19;50
63	utkaladeśe			
	kaṭakagrāme	4;27	Cuttack, B. and O.	20;20
64	jaitapura	5:6	Jaitpur, Hamirpur, U.P.	25;20
65(24)	gahorā	5;57	Gaur, Malda, Bengal	24;50
66 (26)	gayāyām	4;32	Gaya, B. and O.	24;40
67 (159)	āgarā	6;0	Agra, U.P.	27;10
68 (11)	kanauja	6;0	Kanauj, Farrukhabad, U.P.	27;0
69	thāneśvara	6;30	Thanesar, Karnal, Punjab	30;0
70 (12, 60)	kurukṣetra	6;30	Kurukṣetra	
71	rohatārāga	6;30	Rahtak, Punjab	28;50
72 (6)	kāśmīra	7;30	Kashmir	
73 (8)	kābila	8;30		
74 (13)	kāpila		Kabul, Afghanistan	34;30
	(cf. 32, 82)	7;22	Rummindei, Nepal	
75 (130)	mithilā	6;6	Janakpur, Nepal	26;40
76 (86)	dadhigrāme	4;4	Dohad, Panch Mahals, Bombay	22;50
77	siṃhanade	7;13		
78 (1)	ujjayinyāṃ	5;0	Ujjain, Gwalior, C.I.	23;10
79	dasora	5;11	Mandasar, Gwalior, C.I.	24;0
80 (116?)	vadhanāpura	5;20	Wadhwan, Kathiawar, W.I.	22;40
81 (77)	hisāra	6;45	Hissar, Punjab	29;10
82 (13)	kaṃpilāyām			
	(cf. 32, 74)	6;15	Rummindei, Nepal	
83	aṃbhala	5;51	Ambala, Punjab	30;20
84	solāpura	3;38	Sholapur, Bombay	17;40
85 (19)	govā	6;0	Goa, Portuguese India	15;30
86 (62)	bhṛgukṣetre	4;48	Broach, Bombay	21;40
87	vaṭapatra	4;54	Baroda	22;20
88 (158)	ahamadāvāda	5;0	Ahmadabad, Bombay	23;0
89 (114)	kanaḍī			
	vijāpura	3;41	Bijapur, Bombay	16;50
90	hūkerī			
	vinnārāma	6;10		
91	ubhola	5;0	Abhold, Panch Mahals, Bombay	22;50
92	cīola	5;0	Chaul, Kolaba, Bombay	18;40

Ff. 110r–110v. Table 27 of the *Makaranda*; the solar apogee is placed at Gemini 17;17,7°.

Ff. 111r–111v. Table 28 of the *Makaranda*.

Ff. 112–113v. Table 29 of the *Makaranda*; Mars' apogee is placed at Leo 10; 2, 32°, its node at Taurus 10;3,28°. In this table and

in the succeeding two tables the longitudes of the occurrences of the Greek-letter phenomena are not given.
Ff. 114r–115v. Table 30 of the *Makaranda;* Mercury's apogee is placed at Scorpio 10;28,2°, its node at Aries 20;41,24°.
Ff. 116r–117v. Table 31 of the *Makaranda;* Jupiter's apogee is placed at Virgo 21;21,37°, its node at Gemini 19;40,23°.
F. 118r. Table 2 of the *Grahalāghavasāriṇī* I A.
F. 118v. Table 20 of the Anonymous of 1520.

Oxford Walker 208b (Aufrecht 775). No. 71 in Walker's collection. 7ff.

Ff. 1v–7v. *Candrārkī* composed by Dinakara in 35 verses in A.D. 1578. The last verse differs from that given in *SATIUS,* p. 51b:

śrīmatkauśikagotrajo dvijavaro bārejyasaṃjñe pure
moḍhajñātisamudbhavo dinakaro daivajñacūḍāmaṇiḥ/
cakre candraravisvakoṣṭakagatau śrībrahmapakṣāśritau
dṛgpakṣāv api sākṣiṇau ca viśadathy (?) ādike praṣphuṭām //35//

This expanded form only adds to our information the fact that the *Candrārkī* belongs to the Brāhmapakṣa.

A second hand has written ff. 3v–7v, but the text is continuous.

F. 2r. Table of yearly parameters, epoch positions for Śaka 1500=A.D. 1578, and rāmabījas of the Lord of the year, the Epact, and the tithikendra, identical with that on f. 5v of Poleman 4716 (*SATIUS,* p. 14b).
F. 7v. A verse listing localities on the prime meridian, written by a third hand:

purī rakṣasāṃ devakāntyātha kāntī
sitaḥ parvataḥ prajvalī vatsagulmam/
purī cojjā<yi>nyāhvayā gargarāṭaṃ
kurukṣetramerū bhuvo madhyarekhyā//

Royal Asiatic Society Tod 24. 63ff. On f. 63v is written: saṃ iti śrīmahādevī samāptam saṃvat induśailamuniṣaṭvarṣe āsojamāse śuklapakṣe ekādaśamyāṃ tithau bhārgavavāsare pūjyarṣiśrī 5 śrīmadbhojarājajītaḥ ṛ 5 rohitāsajītaḥ ṛṣiśrī 5 nāthājī tatsiṣyaliṣatamm ṛṣiṣenāṣpena muninā. The copying was finished, then, on Friday 18 June 1719 Julian (reading the year-number from left to right rather than from right to left) by Muni Ṛṣiṣenāṣpa (?),

the pupil of Nāthajī, the pupil of Rohitāsajī, the pupil of Bhojarājī. Presented by Lieut. Col. Tod on 21 February 1824.

Ff. 1v–2r. The *Grahasiddhi* composed by Mahādeva in Śaka 1238=A.D. 1316.

Ff. 2r–3r. Commentary in 15 verses on the *Mahādevī* written by Divākara in Śaka 1500=A.D. 1578. The fifth verse gives the date:

śākaḥ pūrṇanabhokṣacandrarahitas te 'mī gatābdāḥ pṛthak
pañcasthāḥ svakiyair guṇair vinihitāḥ kṣepair yutāḥ syur dhruvāḥ/
meṣādau dyumaṇir yadā gṛhamukhaḥ pūrṇādiko madhyamas
tatkāle dhruvakādhruvau (?) raviguṇau ṣaḍbhir guṇā aṃśakāḥ//

And the twelfth reveals the name of the author:

bījodbhavaṃ dvādaśabhiḥ sahasrair
evāntaraṃ tat kathitaṃ grahajñaiḥ /
evaṃ kṛtaṃ yat tu divākareṇa
vicārya granthān viduṣāṃ hitāya //

On f. 2v Divākara gives several tables of which 1–3 relate directly to the *Mahādevī*, 4–7 to the *Candrārkī* of Dinakara.

1.	Guṇakās (of the Brāhmapakṣa)	
Epact	11;3,53,22,40 tithis	
Lord of the year	1;15,31,17,17 days	
Mars	31;54,1,33,21 × 6° =	3,11;24,9,20,6°
Mercury's anom.	9;7,33,10,22	54;45,19,2,12°
Jupiter	5;3,31,5,7	30;21,6,30,42°
Venus' anom.	37;31,58,58,6	3,45;11,53,48,36°
Saturn	2;2,8,34,12	'12;12,51,25,12°
Lunar node (pāta)	-3;13,35,39,59	-19;21,33,59,54°
Lunar node (rāhu)	56;46,24,20,1	5,40;38,26,0,6°

2.	Kṣepakāḥ	mean sideral longitudes		true tropical longitudes on Sunday 28 March 1316
Epact	3;20,19,11,20 tithis			
Lord of the year	0;38,19,44,16 days			
Mars	24;3,12,7,48 × 6°	2,24;19,12,46,48°		2,1 °
Mercury's anom.	48;35,14,4,42	4,51;31,24,28,12°	(Mercury)	5,53
Jupiter	23;54,0,7,56	2,23;24,0,47,36°		2,29
Venus' anom.	3;15,6,10,48	19;30,37,4,48°	(Venus)	23
Saturn	51;32,39,5,36	5,9;15,54,33,36°		5,24
Lunar node (pāta)	-57;18,48,20,0	-5,43;52,50,0,0°		-5,31

3.	Rāmabījas
Epact	−0;1,15,0 tithis
Lord of the year	−0;2,0,0 days
Mars	+0;0,13,20
Mercury's anomaly	+0;1,56,40
Jupiter	−0;0,31,40
Venus' anomaly	−0;0,45,0
Venus	+0;0,15,0
Lunar node (rāhu)	+0;0,5,0
Lunar node (pāta)	−0;0,5,0

4. Week-days on which the Sun enters each nakṣatra

Aśvinī	4;48,21	Svāti	2;26,27
Bharaṇī	4;30,36	Viśākhā	1;44,38
Kṛttikā	4;18,49	Anurādhā	0;56,43
Rohiṇī	4;12,44	Jyeṣṭhā	0;3,52
Mṛgaśiras	4;10,47	Mūla	6;7,12
Ārdrā	4;11,48	Pūrvāṣāḍhā	5;8,25
Punarvasu	4;14,11	Uttarāṣāḍhā	4;9,15
Puṣya	4;15,53	Śravaṇa	3;11,15
Āśleṣā	4;15,48	Dhaniṣṭhā	2;16,1
Maghā	4;12,23	Śatabhiṣak	1;25,9
Pūrvaphālgunī	4;4,9	Pūrvabhādrapadā	0;39,40
Uttaraphālgunī	3;50,2	Uttarabhādrapadā	0;0,44
Hasta	3;29,18	Revatī	6;29,7
Citra	3;1,28		

Compare table 21 of the *Jagadbhūṣaṇa*.

5. Gunakāḥ (cf. Poleman 4716 [*SATIUS*, p. 14b]).

Lord of the Year	1;15,31,17,17 days
Epact	11;3,53,22,40 tithis
Tithikendra	7;40,30,44,0 tithis

6. Kṣepakāḥ (cf. Poleman 4716 [*SATIUS*, p. 14b]).

Lord of the Year	6;20,57,12,30 days
Epact	22;19,34,10,0 tithis
Tithikendra	21;52,16,55,0 tithis

7. Yearly motion

Moon	2,12;46,40,48°
Lunar anomaly	1,32;6,8,48°
Lunar node	-19;17,34,0°

Cf. the *Candrārkī* of Dinakara

F. 3r. Several more tables relating to the *Candrārkī* of Dinakara.

1. Table of the week-days on which the Sun enters each of the 12 zodiacal signs; above it is written the following verse;

catuṣṭayaikyarāmabījāḥ saṃskṛtā mahānakṣatrasaṅkrāntayaḥ /
deśāntaro rāmabīja atra deśīyā dinakarakṛtāḥ // 1 //

Aries	4;48,28	Leo	4;12,23	Sagittarius	6;7,12
Taurus	0;46,49	Virgo	0;15,32	Capricorn	0;24,34
Gemini	4;11,2	Libra	2;44,50	Aquarius	1;50,0
Cancer	0;45,32	Scorpio	4;39,15	Pisces	3;39,52

Compare table 21 of the *Jagadbhūṣaṇa.*

2. Table of rāmabījas; above it is written a statement commencing with a reference to the *Candrārkī.*

Epact	-0;1,15
Lord of the year	0;0,0
Kendra	-0;3,45

F. 3r. Table of mean positions according to the *Mahādevī* of the Lord of the year, Epact, Mars, Mercury's anomaly, Jupiter, Venus' anomaly, Saturn, the Lunar node, the Moon, and the Lunar apogee (kendra) for Śaka 1597 to 1601=A.D. 1675 to 1679. In the following transcriptions I have multiplied the planetary entries by 6° as they are expressed in terms of sets of tables wherein $\triangle\lambda = 6°$.

	Śaka 1597	1598	1599	1600	1601
Lord of the year	4;29,54	5;45,25	0;0,56	1;16,27	2;31,58
Epact	15;35,25	26;39,18	7;43,17	18;47,4	29;50,57
Mars	1,39;9,12°	4,50;33,48°	2,1;57,24°	5,13;21,30°	2,24;45,36°
Mercury's conj.	2,40;22,24	3,35;7,42	4,29,53,0	5,24;38,18	19;23,36
Jupiter	3,56;32,48	4,26;53,54	4,57;15,0	5,29,36,6(!)	5,59;57,12
Venus' conj.	3,41;22,54	1,26;34,48	5,11;46,42	2,56;58,36	42;10,30
Saturn	15;42,54	27;55,48	40;8,42	52;21,36	1,10;34,30 (!)
Lunar node	266;11	246;49	227;27	208;5	188,43
Moon	187;7,34	319;45,15	92;40,56	225;27,37	358;14,18
Lunar anomaly	195;18,1	287;24,8	19;30,16	111;36,24	203;42,23

Ff. 3v–13r. Table 9 of the *Mahādevī* for N = O to 59.
Ff. 13v–33r. Table 10 of the *Mahādevi* for N = O to 59.
Ff. 33v–43r. Table 11 of the *Mahādevī* for N = O to 59.
Ff. 43v–53r. Table 12 of the *Mahādevī* for N = O to 59.
Ff. 53v–53r. Table 13 of the *Mahādevī* for N = O to 59.

Royal Asiatic Society Tod 36. Seven manuscripts bound together. Presented by Lt. Col. Tod on 21 Feb. 1824.

Tod 36a. 12ff.

F. 1v. Table 1 of the *Grahalāghavasāriṇī* I; the dhruvāṅkas are 11 to 30 in tables 1 to 9.
Ff. 1v–2r. Table 2 of the *Grahalāghavasāriṇī* I.
F. 2r. Table 3 of the *Grahalāghavasāriṇī* I.
Ff. 2r–2v. Table 4 of the *Grahalāghavasāriṇī* I.
Ff. 2v. Table 5 of the *Grahalaghavasāriṇī* I.
Ff. 2v–3r. Table 6 of the *Grahalāghavasāriṇī* I.
F. 3r. Table 7 of the *Grahalāghavasāriṇī* I.
Ff. 3r–3v. Table 8 of the *Grahalāghavasāriṇī* I.
F. 3v. Table 9 of the *Grahalāghavasāriṇī* I.
F. 4r. Table 10 of the *Grahalāghavasāriṇī* I.
F. 4v. Table 11 of the *Grahalāghavasāriṇī* I.
F. 5r. Table 12 of the *Grahalāghavasāriṇī* I.
Ff. 5v–6r. Table 17 of the *Grahalāghavasāriṇī* I.
F. 6v. Table 13 of the *Grahalāghavasāriṇī* I.
Ff. 7r–7v. Table 18 of the *Grahalāghavasāriṇī* I.
F. 8r. Table 14 of the *Grahalāghavasāriṇī* I.
Ff. 8v–9r. Table 19 of the *Grahalāghavasāriṇī* I.
F. 9v. Table 15 of the *Grahalāghavasāriṇī* I.
Ff. 10r–10v. Table 20 of the *Grahalāghavasāriṇī* I.
F. 11r. Table 16 of the *Grahalāghavasāriṇī* I.
F. 12v. Blank.

Tod 36b. 28ff.

Ff. 1v–2v. *Tithisāraṇī* composed by Dinakara in Śaka 1505 = A.D. 1583 with marginal notes in second hand.
F. 2v. Additional verses in second hand.
Ff. 3r–7v. Table 1 of the *Tithisāraṇī*.
Ff. 7v–12r. Table 2 of the *Tithisāraṇī*.
Ff. 12r–16v. Table 3 of the *Tithisāraṇī*.
F. 16v. Tables 4 to 5 of the *Tithisāraṇī*.
Ff. 17r–20v. Table 6 of the *Tithisāraṇī*.
Ff. 21r–24v. Table 7 of the *Tithisāraṇī*.
Ff. 25r–28v. Table 8 of the *Tithisāraṇī*.
F. 28v. Table 9 of the *Tithisāraṇī*.

Tod 36c. 17ff. On f. 17v. is written: Āśādhara.

Ff. 1r–7v. Table 9 of the *Grahajñāna* for N = 1 to 27.

Ff. 7v–14r. Table 10 of the *Grahajñāna* for N = 1 to 27.
Ff.14v–17v. Table 11 of the *Grahajñāna* for N = 1 to 13 and for k = 1 to 7 of N = 14.

Tod 36d. 14ff.

F. 1v. Table 1 of the *Grahalāghavasāriṇī* I; the dhruvāṅkas are 3 to 20 in tables 1 to 9.
Ff. 1v–2r. Table 2 of the *Grahalāghavasāriṇī* I.
F. 2r. Table 3 of the *Grahalāghavasāriṇī* I.
Ff. 2r–2v. Table 4 of the *Grahalāghavasāriṇī* I.
Ff. 2v–3r. Table 5 of the *Grahalāghavasāriṇī* I.
F. 3r. Table 6 of the *Gruhalāghavasāriṇī* I.
Ff. 3r–3v. Table 7 of the *Grahalāghavasāriṇī* I.
F. 3v. Table 8 of the *Grahalāghavasāriṇī* I.
Ff. 3v–4r. Table 9 of the *Grahalāghavasāriṇī* I.
F. 4r. Tables 22 to 24 of the *Grahalāghavasāriṇī* I A.
Ff. 4r–4v. Table 25 of the *Grahalāghavasāriṇī* I A.
F. 4v. Tables 26 to 28 of the *Grahalāghavasāriṇī* I A.
Ff. 4v–5r. Table 29 of the *Grahalāghavasāriṇī* I A.
F. 5r. Tables 33, 31, and 32 of the *Grahalāghavasāriṇī* I A.
Ff. 5r–5v. Table 10 of the *Grahalāghavasāriṇī* I.
Ff. 5v–6r. Table 11 of the *Grahalāghavasāriṇī* I.
Ff. 6r–6v. Table 12 of the *Grahalāghavasāriṇī* I.
Ff. 6v.–7r. Table 13 of the *Grahalāghavasāriṇī* I.
Ff. 7v–8r. Table 14 of the *Grahalāghavasāriṇī* I.
Ff. 8r–8v. Table 15 of the *Grahalāghavasāriṇī* I.
Ff. 8v–9r. Table 16 of the *Grahalāghavasāriṇī* I.
Ff. 9r–10r. Table 17 of the *Grahalāghavasāriṇī* I.
Ff. 10r–11r. Table 18 of the *Grahalāghavasāriṇī* I.
Ff. 11r–12r. Table 19 of the *Grahalāghavasāriṇī* I.
Ff. 12r–13v. Table 20 of the *Grahalāghavasāriṇī* I.
Ff. 13v–14v. Table 21 of the *Grahalāghavasāriṇī* I.
F. 14v. Two verses, of which the first refers to Śaka 1442 = A.D. 1520:

dvyabdhīndronitaśaka īśahṛt phalaṃ syāc
cakrākhyaṃ ravihataśeṣakaṃ triyuktam /
caitrādyai pṛthak amutaṃ sadṛgghnacakrā
tad imaṃ yuktād amaraphalādhimāsayuktam // 1 //

Tod 36e. 87ff. On f. 87r in the margin is written: iti śrījagadbhūṣaṇa saṃpūrṇa liṣataṃ paṃ naravijaya gajendravijayaga(?) tmārthe śrīśāntināthajīprasādāt saṃvat 1820 varṣe vaiśāṣaśudi 8 guruvāsare pūṣyanakṣatre tratīyaprahare lipīkṛtā śrījayavaṃti. The copying was finished, then, by Naravijaya for Gajedravijaya by the favor of Śāntināthajī on Thursday 10 April 1763 Julian.

Ff. 1r–20v. Table 1 of the *Jagadbhūṣaṇa* for N = Śaka 1611 and 1690 (= A.D. 1689 and 1768) to N = Śaka 1690 and 1768 (= A.D. 1768 and 1846). A fourth column. entitled cakra, whose function is not understood, is added to the planetary tables in this manuscript.
Ff. 21r–31v. Table 2 of the *Jagadbhūṣaṇa* for N = Śaka 1534, 1580, and 1626 (= A.D. 1612, 1658, and 1704) to N = Śaka 1669 and 1715 (= A.D. 1747 and 1793); it should continue to N Śaka 1671 (= A.D. 1749).
Ff. 32r–52v. Table 3 of the *Jagadbhūṣaṇa* for N = Śaka 1532 and 1615 (= A.D. 1610 and 1693) to N = Śaka 1697 (= A.D. 1775).
Ff. 52v–72v. Table 4 of the *Jagadbhūṣaṇa* for N = Śaka 1500 (A.D. 1578) to N = Śaka 1516 (= A.D. 1594); for N = Śaka 1549 (1517 + [8 × 4]) (= A.D. 1627) to N = Śaka 1560 (= A.D. 1638); for N = Śaka 1577 (1561 + [8 × 2]) (= A.D. 1655) to Śaka 1582 (= A.D. 1660); and for N = Śaka 1599 (1583 + [8 × 2]), 1607, and 1615 (= A.D. 1677, 1685, and 1693) to N = Śaka 1691 and 1723 (= A.D. 1769 and 1801).
Ff. 72v–87r. Table 5 of the *Jagadbhūṣaṇa* for N = Śaka 1650 (= A.D. 1728) to N = Śaka 1649 and 1708 (= A.D. 1727 and 1786).

Tod 36f. Ff. 1–2* and 2–24. On f. 1v, after the colophon of Mahādeva's *Kāmadhenusāraṇī*, is written: paṃ lakṣmīvijaya likhitaṃ.

Ff. 1r–1v. *Kāmadhenu* composed by Mahādeva in Śaka 1279 = A.D. 1357.
F. 1v. Additional text with parameters.
Ff. 2*r–2*v. Astrological text; from another manuscript.
F. 2r. Tables 1 to 3 of the *Kāmadhenu*.
F. 2v. Tables 4 to 6 of the *Kāmadhenu*. Above table 4 is written: Śāke 1405 pravarttamāne ayanāṃśā 16 33 0 0 samaye spaṣṭaṃ dinamānaṃ vārapravṛttayaḥ. Śaka 1405 is A.D. 1483. At a rate

of precession equal to 1° every 60 years, the precession would be zero (reading 16;23° for 16;33°) in Śaka 422 = A.D. 500.

F. 3r. Table 7 of the *Kāmadhenu*..
Ff. 3r–3v. Udāharaṇa (partly in deśī) for Saṃ. 1628, Śaka 1497 = A.D. 1571.
F. 3v. Tables 8 to 11 of the *Kāmadhenu*.
Ff. 4r–9v. Table 12 of the *Kāmadhenu*.
F. 10r. Table 13 to 14 of the *Kāmadhenu*.
Ff. 10r–10v. Udāharaṇa in deśī.
F. 11r. Tables 15 to 18 of the *Kāmadhenu*.
Ff. 11v–17r. Table 19 of the *Kāmadhenu*.
Ff. 17v–23r. Table 20 of the *Kāmadhenu*.
F. 23v. Tables 21 to 22 of the *Kāmadhenu*.
Ff. 23v–24r. Commentary.

Tod 36g. 76ff.

Ff. 1r–15v. Table 9 of the *Mahādevī* for N = 0 to 59.
Ff. 16r–30v. Table 10 of the *Mahādevī* for N = 0 to 59.
Ff. 31r–33r. Table 11 of the *Mahādevī* for N = 0 to 8.
F. 33r. Table 11 of the *Mahādevī* for N = 8 repeated.
Ff. 33v.–41v. Table 11 of the *Mahādevī* for N = 10 to 43.
F. 42r. Table 11 of the *Mahādevī* for N = 42 to 43 repeated.
Ff. 42v–46r. Table 11 of the *Mahādevī* for N = 44 to 59.
F. 46v. Table 11 of the *Mahādevī* for N = 9.
Ff. 46v–55v. Table 12 of the *Mahādevī* for N = 0 to 36.
Ff. 56r. Table 12 of the *Mahādevī* for N = 39 to 40.
F. 56v. Table 12 of the *Mahādevī* for N = 37 to 38.
Ff. 57r–61v. Table 12 of the *Mahādevī* for N = 41 to 59.
Ff. 61v–76v. Table 13 of the *Mahādevī* for N = 0 to 59.

Royal Asiatic Society Tod 45. Ff. 1 and 1bis–77. On f. 76v. is written:

iti śrīmahādevigraṃtha saṃpūrṇaṃ saṃvat 1789 varṣe śāke 1654 paṃḍitottama paṃditaśrīrūpavijayagaṇi tatchikṣa paṃ
sujāṇvijayaga
tatchiṣyaṃga bhojavijaya likhyataṃ ātmārthe // lāhāgrāme....It was copied, then, by Bhojavijaya, pupil of Sujāṇavijaya, pupil of Rūpavijaya gaṇi in Lāhāgrāma in Saṃ. 1789, Śaka 1654 = A.D. 1732.

On f. 77v. is written, by a hand different from Bhojavijaya's: paṇḍita śrīrūpavijayagaṇi.

F. 1v. Table of the true longitudes of the Sun and its corresponding daily progresses for 1 to 27 avadhis; ascribed to the *Mahādevī*. The initial position is 2;9,40°, that for avadhi 27 (= day 364) is 0;55,49°. The maximum daily progress is 1;1,23° at avadhi 20, the minimum 0;56,53° at avadhi 7.

F. 1v. Table of the mean motion of the Lunar node for 1 to 27 avadhis. This motion at avadhi 27 is 19;7,34°.

Ff. 1bis r–1bis v. Table of the positions of the Epact, Lord of the Year, Mars, Mercury, Jupiter, Venus, Saturn and the Lunar node according to the *Mahādevī* in steps of 20 years for Śaka 1600 to 1820 = A.D. 1678 to 1898, and for 1 to 20 years.

Ff. 2r–16v. Table 9 of the *Mahādevī* for N = 0 to 59.

Ff. 17r–31v. Table 10 of the *Mahādevī* for N = 0 to 59.

Ff. 32r–46v. Table 11 of the *Mahādevī* for N = 0 to 59.

Ff. 47r–61v. Table 12 of the *Mahādevī* for N = 0 to 59.

Ff. 62r–76v. Table 13 of the *Mahādevī* for N = 0 to 59.

Ff. 77r–77v. Table of the longitudes of the Lunar node at the beginnings of Śaka 1600 to 1719 = A.D. 1678 to 1797; only filled in to Śaka 1697 = A.D. 1775.

Royal Asiatic Society Tod 57, 15ff. On f. 15r is written: iti grahalāghavasya sāraṇī samāptam / saṃvat 1777 varṣe mārgaśīrṣa sudi 10 dine caṃdre saṃpūrṇīkṛta / udayapuramadhye paṃpa pratāpasījīśiṣya pārśvadattena lipīkṛtā svavācanārthe /. The copying was finished, then, by Pārśvadatta, the pupil of Pratāpasiṃhajī, at Udayapura (Udaipur) on Monday 28 November 1720 Julian. Presented by Lt. Col. Tod 21 February, 1824.

F. 1v. Table 1 of *Grahalāghavasāriṇī* I A.
F. 2r. Table 2 of *Grahalāghavasāriṇī* I A.
F. 2v. Table 3 of *Grahalāghavasāriṇī* I A.
F. 3r. Table 4 of *Grahalāghavasāriṇī* I A.
F. 3v. Table 5 of *Grahalāghavasāriṇī* I A.
F. 4r. Table 6 of *Grahalāghavasāriṇī* I A.
F. 4v. Table 7 of *Grahalāghavasāriṇī* I A.
F. 5r. Table 8 of *Grahalāghavasāriṇī* I A.
F. 5v. Table 9 of *Grahalāghavasāriṇī* I A.
F. 6r. Table 10 of *Grahalāghavasāriṇī* I.

F. 6v. Table 11 of *Grahalāghavasāriṇī* I.
F. 7r. Table 12 of *Grahalāghavasāriṇī* I.
F. 7v. Table 13 of *Grahalāghavasāriṇī* I.
F. 8r. Table 14 of *Grahalāghavasāriṇī* I.
F. 8v. Table 15 of *Grahalāghavasāriṇī* I.
F. 9r. Table 16 o *Grahalāghavasāriṇī* I.
Ff. 9v–10r. Table 17 of *Grahalāghavasāriṇī* I.
Ff. 10v–11r. Table 18 of *Grahalāghavasāriṇī* I.
Ff. 11v–12r. Table 19 of *Grahalāghavasāriṇī* I.
Ff. 12v–13r. Table 20 of *Grahalāghavasāriṇī* I.
Ff. 13v–14r. Table 21 of *Grahalāghavasāriṇī* I.
F. 14v. Tables 22 to 25 of *Grahalāghavasāriṇī* I A.
Ff. 14v–15r. Table 26 of *Grahalāghavasāriṇī* I A.
F. 15r. Tables 27 to 33 of *Grahalāghavasāriṇī* I A.

Royal Asiatic Society Tod. 59, 112ff. On f. 111v (after table 20) is written: iti śrījagadbhūṣaṇa samāptaṃ saṃvat 1786 varṣe śrāvaṇa śuda 15. The copying was completed, then, on 30 July 1729 Julian. Presented by Lieut. Col. Tod on 21 February 1824.
Ff. 1v–21r. Table 1 of the *Jagadbhūṣaṇa* for N = 0 to 78.
Ff. 21r–32v. Table 2 of the *Jagadbhūṣaṇa* for N = 0 to 45.
Ff. 32v–52r. Table 3 of the *Jagadbhūṣaṇa* for N = 0 to 82.
Ff. 53v–96r. Table 4 of the *Jagadbhūṣaṇa* for N = 0 to 226 (column 3 is omitted in N = 48 to 226).
Ff. 96v–111r. Table 5 of the *Jagadbhūṣaṇa* for N = 0 to 58.
F. 111r. Table 20 of the *Jagadbhūṣaṇa*.
Ff. 111v–112r. Table of the motion of the Lunar node from Śaka 1540 to 1677 = A.D. 1618 to 1755. The yearly motion is –19;21,34°; the longitude at the beginning of Śaka 1540 was 290;0,9°.

Trinity College, Cambridge R. 15. 108. 20ff. Bengālī script. Procured in Bengal by John Bentley (died 1824); acquired by Trinity College in 1858.
Ff. 1v–10v. *Ravisiddhāntamañjarī* composed by Mathurānātha Śarman in Śaka 1531 = A.D. 1609.
F. 10v. Table of the declination of the Sun for 1 to 60 arcs of 3°. The maximum is 24° at 30 (= 90°).
F. 10v. Table 1 of the *Ravisiddhāntamañjarī* for 1 to 35; the column of differences is omitted.
F. 10v. Table 2 of the *Ravisiddhāntamañjarī* for 1 to 27; the column of differences is omitted.

F. 11r. Table 50 of the *Ravisiddhāntamañjarī*.
F. 11v. Table 51 of the *Ravisiddhāntamañjarī*.
F. 12r. Table 52 of the *Ravisiddhāntamañjarī*.
Ff. 12r–12v. Table 53 of the *Ravisiddhāntamañjarī*.
Ff. 12v–13r. Table 54 of the *Ravisiddhāntamañjarī*.
Ff. 13r–13v. Table 55 of the *Ravisiddhāntamañjarī*.
F. 13v. Table 56 of the *Ravisiddhāntamañjarī*.
F. 14r. Table 57 of the *Ravisiddhāntamañjarī*.
Ff. 14r–14v. Table 58 of the *Ravisiddhāntamañjarī*.
Ff. 14v. Table 59 of the *Ravisiddhāntamañjarī*.
Ff. 14v–15r. Table 60 of the *Ravisiddhāntamañjarī*.
Ff. 15r–15v. Table 61 of the *Ravisiddhāntamañjarī*.
F. 15v. Tables 35 to 37 of the *Ravisiddhāntamañjarī*, but in tables 35 to 49 this manuscript gives entries only to seconds.
F. 16r. Tables 38 to 41 of the *Ravisiddhāntamañjarī*, but table 40 is split into two; for 1 to 30 days, and for 30–day periods from 60 to 360 days and for 365 days.
F. 16v. Table 42 to 45 of the *Ravisiddhāntamañjarī*, but tables 44 and 45 are split as is table 40.
Ff. 16v–17r. Table of the mean motion of Venus' śīghra for 1 to 30 daṇḍas.
F. 17r. Table of 10 entries of which the first is 2.22.42 and the difference is 2.2.2 (but the scribe has written 4.24.46 as the second instead of 4.24.44, and 20,24,48 as the tenth instead of 20,40,0). The first of table 46 of the *Ravisiddhāntamañjarī* is missing.
F. 17. Tables 46 to 48 of the *Ravisiddhāntamañjarī*, but only the latter part of table 46 is given: for 30–day periods from 60 to 360 days and for 365 days.
Ff. 17r–17v. Table 49 of the *Ravisiddhāntamañjarī*, but split as is table 40.
F. 17v. Tables 3 to 7 of the *Ravisiddhāntamañjarī*, but tables 3 and 7 are for Śaka 1531 to 1671 = A.D. 1609 to 1749 and table 5 is for Śaka 1531 to 1691 = A.D. 1609 to 1769.
F. 18r. Tables 8 to 13 of the *Ravisiddhāntamañjarī*. but tables 9 and 13 are for Śaka 1531 to 1671 = A.D. 1609 to 1749 and table 11 is for Śaka 1531 to 1691 = A.D. 1609 to 1769.
F. 18v. Tables 14 to 18 of the *Ravisiddhāntamañjarī*, but tables 15 and 17 are for Śaka 1531 to 1671 = A.D. 1609 to 1749.
F. 19r. Tables 19 and 20, 23 and 24, and 21 and 22 of the *Ravisiddhāntamañjarī*, but table 23 is for Śaka 1531 to 1651 = A.D. 1609

to 1729, table 21 for Śaka 1531 to 1671 = A.D. 1609 to 1749, and table 19 for Śaka 1531 to 1691 = A.D. 1609 to 1769.
F. 19v. Tables 25 to 34 of the *Ravisiddhāntamañjarī*.
F. 19v. Table of the longitudes of the beginnings of the 27 nakṣatras.
F. 20r. Table of the lengths of the solar months in days.

Vaiśākha	30;56,52	Kārttika	29;52,52
Jyeṣṭha	31;25,41	Mārga	29;28,58
Āṣāḍha	31;38,37	Pauṣa	29;19,8
Śrāvaṇa	31;27,58	Māgha	29;27,22
Bhādra	31;0,21	Phālguna	29;50,5
Āśvina	30;25,38	Caitra	30;22,0

The total is 6,5;15,32 days.

F. 20r. Table of week–days of the months. This table consists of each of the entries in the preceding table diminished by 28 days (= 4 weeks).
F. 20r. Table of the length of daylight measured in ghaṭikāṣ during each *month:*

Vaiśākha	31;1	Bhādra	32;18	Pauṣa	26;31
Jyeṣṭha	32;33	Āśvina	30;42	Māgha	26;31
Āṣāḍha	33;29	Kārttika	28;59	Phālguna	27;42
Śrāvaṇa	33;23	Mārga	27;27	Caitra	29;18

F. 20v. Table of the week–days on which the Sun enters the 12 zodiacal signs. This table is computed by adding the entries in the table of the lengths of solar months and casting out 7's.

<Aries	0;0,0>
Taurus	2;56,62
Gemini	6;22,33
Cancer	3;1,20 (read 3;4,20)
Leo	6;29,8 (a mistake, but the author's)
Virgo	2;29,29
Libra	4;57,7 (read 4;55,7)
Scorpio	6,47,59
Sagittarius	1;26,57 (a mistake, but the author's)
Capricorn	2;36,5 (read 2;46,5)
Aquarius	4;7,27 (read 4;3,27)
Pisces	5;53,32

F. 20v. Table of the mean longitudes of the Sun when the true Sun enters the 12 zodiacal signs.

Aries	5,57;51,31°	Leo	2,1;31,43°	Sagittarius	4,0;38,2°
Taurus	28;21,8°	Virgo	2,32;6,4°	Capricorn	4,29;31,48°
Gemini	59;19,5°	Libra	3,2;6,26°	Aquarius	4,58;33,12°
Cancer	1,30;30,14°	Scorpio	3,31;34,4°	Pisces	5,27;56,42°

F. 20v. Table of rising-times, expressed in ghaṭikās.

Aries	3,47
Taurus	4;17
Gemini	5;6
Cancer	5;40
Leo	5;41
Virgo	5;29
	30;0

Trinity College, Cambridge R. 15. 122. 4ff. Bengālī script. Procured in Bengal by John Bentley (died 1824); acquired by Trinity College in 1858.

Ff. 1v–3r. *Grahamañjarī.* Incomplete.

Ff. 3v–4v. Table 1 of the *Grahamañjarī* for 0 to 239.

Trinity College, Cambridge R. 15. 123. 33ff. Bengālī script. Procured in Bengal by John Bentley (died 1824); acquired by Trinity College in 1858.

Ff. 1r–4v. *Grahamañjarī.*
Ff. 4–6v. Table 1 of the *Grahamañjarī.*
Ff. 6v.–10r. Table 2 of the *Grahamañjarī.*
Ff. 10v–12v. Table 3 of the *Grahamañjarī.*
Ff. 12v–16v. Table 4 of the *Grahamañjarī.*
Ff. 16v–18r. Table 5 of the *Grahamañjarī.*
Ff. 18r–22v. Table 6 of the *Grahamañjarī.*
Ff. 22v–24v. Table 7 of the *Grahamañjarī.*
Ff. 24v–28v. Table 8 of the *Grahamañjarī.*
Ff. 28v–30r. Table 9 of the *Grahamañjarī.*
Ff. 30r–33v. Explanatory text.

The *Grahajñāna* of Āśādhara.

1 The Life of Āśādhara

Verses 28–30 of the *Grahajñāna*, which are copied by Harihara as verses 110–112 of his *Gaṇitacūḍāmaṇi*, inform us of Āśādhara's lineage:

āsīd ṛṣiḥ sannihitādhivāsī
 śrīmudgalo brahmavidāṃ variṣṭhaḥ /
tasyānvaye vedavidāṃ variṣṭhaḥ
 śrībhānunāmā ravivat prasiddhaḥ // 28 //

tasyotpannaḥ prathamatanayo viṣṇunāmā manīṣī
 vede śāstre'pratihatamatis tasya putro babhūva /
śrīvatsākhyo dhanapatir asau kalpavṛkṣopamānas
 tasyaiko 'bhūt pravaratanayo rihlukākhyaḥ sa vidvān // 29 //

tasyādyasūnur gaṇako 'bjabhānur
 āśādharo viṣṇupadāmbu (ja) saktaḥ /
vedottamāṅgaṃ bahuśāstrasāraṃ
 cakāra daivajñahitāya śāstram // 30 //

From these lines we learn that Āśādhara, a devotee of Viṣṇu, was the eldest son of Rihluka (Bohita according to Harihara), who was the unique son of the wealthy Vatsa, who was the son of Viṣṇu, the son of Bhānu, a Brāhmaṇa of the Maudgalyagotra.

The epoch of his *Grahajñāna* is given as Śaka 1054 = A.D. 1132 and his indebtedness to the Brāhmapakṣa acknowledged in verses 1–2:

brahmeśācyutacandravitsitaravikṣoṇīsutejyārkajān
 nakṣatrāṇi sarasvatīṃ gaṇapatiṃ natvā pṛthak bhaktitaḥ /
śrībrahmoktaparisphuṭopakaraṇair bhaumādayo yādṛśās
 tattulyānayanaṃ bravīmi sukhadaṃ mandāśrupātair vinā //1//

śāko'bdhibāṇadaśabhir viyuto hato 'śvi–
 bāṇaiḥ pṛthak śaśinavāṣṭanṛpāptahīnaḥ /
candrābhrayugmavihṛtaḥ phalam abdayuktaṃ
 saptoddhṛtaṃ bhavati saṅkramaṇadhruvo 'yam // 2 //

The date is confirmed by the kṣepas given below in section III, and the parameters are indeed those of the Brāhmapakṣa (discrepancies are due to roundings in computing tabular entries). Brahman is again referred to in verse 19 as Nalinīnātha, and the *Brahmasiddhānta* is mentioned in verse 21. An unidentified astronomer, the Brāhmaṇa Nārmada, appears in verse 22.

The *Grahajñāna* has been almost entirely incorporated into the *Gaṇitacūḍāmaṇi* of Harihara. I list below the correspondences:

Aśādhara	Harihara
1-2	1-2
4	3
6-9	14-17
10-13	34-37
17	41
18	58
19	60
20	67
21	39
22	46
23-24	18-19
28-30	110-112

II. Manuscripts:

*IO 2464b and c. 10ff. Copied in Saṃ 1694, Śaka 1559 = A.D. 1637.
BORI 257. 1f. Copied in Saṃ. 1708 = A.D. 1651.
Baroda 7635(a). 1f. Copied in Saṃ. 1833 = A.D. 1776.
Ānandāśrama 5417.
Anup 4946. 2ff.
Dāhilakṣmī XXXIII 59.
LDI 6674 (5780). 1f.
PL, Buhler IV E 63. 4ff. Property of Mayādhara Muralīdhara of Mehmadābād.
*RAS Tod 36c. 17ff.

III. Tables.

The mean motion tables are for 1 to 9, 10 to 90, 100 to 900, and 1,000 to 10,000 years; the entries for the planets refer to a set of tables of their true longitudes. The corresponding mean longitudes

equal the tabular entries (which are negative) multiplied by 13;20° and subtracted from 360°. Above each table is given the kṣepa and a bīja. The kṣepas, multiplied by 13;20° and subtracted from 360°, indicate that the epoch is Sunday 20, March 1132 (the kṣepa of the lunar node is given in degrees).

	kṣepas	mean sidereal longitudes	true tropical longitudes	differences
Lord of the year	0;0,0,0,0 days			
Mars	-11;37,2,33	205;6,6,0,0°	230°	-25°
Mercury's anomaly	-5;25,37,16	287;38,23,6,40	(Mercury) 340	
Jupiter	-3;6,48,36	318;29,12,0,0	330	-12
Venus' anomaly	-1;32,3,9	339;32,38	(Venus) 356	
Saturn	-10:22,3,32	221;45,52,53,20	240	-18
Lunar node	-21;7,33°	338;52,27	349	-10

The bījas are as follows:

Lord of the year	—0;2,30 days	Jupiter	—0;14,15°
Mars	+0;6°	Venus' anomaly	—0;20,15°
Mercury's anomaly	+0;52,30°	Saturn	+0;6,45°

1. Table of the Lord of the Year. The yearly motion is 1;15,31,17,17 days, so that a year is 6,5;15,31,17,17 days.
Manuscripts: IO 2464c. f. 1v.

2. Table of the mean motion of Mars. The mean yearly motion is 3,11;24,9,20°.
Manuscripts: IO 2464c. f. 3r

3. Table of the mean motion of Mercury's anomaly. The mean yearly motion is 54;45,19,2,13,20°.
Manuscripts: IO 2464c. f. 3v.

4. Table of the mean motion of Jupiter. The mean yearly motion is 30;21,6,17,20°.
Manuscripts: IO 2464c. f. 4r.

5. Table of the mean motion of Venus' anomaly. The mean yearly motion is 3,45;11,53,48,40°.
Manuscripts: IO 2464c. f. 4v.

6. Table of the mean motion of Saturn. The mean yearly motion is 12;12,51,25,6,40°.
Manuscripts: IO 2464c. f. 5r.

7. Table of the motion of the lunar node in two parts: the first is for 1 to 27 periods of 27 collected years, the second, 1 to 27 single years. The yearly motion is -19;21,34°.
Manuscripts: IO 2464c, f. 6r.

8. Table of the longitudes of the lunar node at the Sun's entry into each of the 27 nakṣatras, in four columns. Column 1 gives the initial of the nakṣatra, column 2 the longitude of the node, column 3 the node's daily motion (always 0;3,11°), and column 4 the numbers of the nakṣatras (1 to 27).

Nakṣatra	*Longitude*	*Difference*	Nakṣatra	Longitude	*Difference*
Aśvinī	-0;0,0°		Svātī	-10;15,45	0;42,37
Bharaṇī	-0;43,31	0;43,31	Viśākhā	-10;58,1	0;42,16
Kṛttikā	-1;27,24	0;43,53	Anurādhā	-11;39,59	0;41,58
Rohiṇī	-2;11,36	0;44,12	Jyeṣthā	-12;21,43	0;41,44
Mṛgaśiras	-2;56,3	0;44,27	Mūla	-13;3,18	0;41,35
Ārdrā	-3;40,41	0;44,38	Pūrvāṣāḍhā	-13;44,45	0;41,27
Punarvasu	-4;25,23	0;44,42	Uttarāṣāḍhā	-14;26,12	0;41,27
Puṣya	-5;10,4	0;44,41	Śravaṇa	-15;7,42	0;41,30
Āśleṣā	-5;54,38	0;44,34	Dhaniṣthā	-15;49,19	0;41,37
Maghā	-6;38,59	0;44,21	Śatabhiṣak	-16;31,9	0;41,50
Pūrvaphālgunī	-7;23,3	0;44,4	Pūrvabhādrapadā	-17;13,15	0;42,6
Uttaraphālgunī	-8;6,47	0;43,44	Uttarabhādrapadā	-17;55,39	0;42,24
Hasta	-8;50,9	0;43,22	Revatī	-18;38 24	0;42,45
Citra	-9;33,8	0;42,59	<Aśvinī	-19;21,34	0;43,10>

Manuscripts: IO 2464c. f. 6v.

9. Table of the true longitudes of Mars. There exists a table for each increment of 13;20° (a nakṣatra) in Mars' mean longitude, and each table begins at the beginning of a moon sidereal year with the Sun at Aries 0°. There are, then, 27 (N = 1 to 27) tables. Each of these contains 4 columns; the first gives as the argument 1 to 27 avadhis of 14 days each, the second the true longitudes of the planet, the third the daily progress of the planet at the beginning of each avadhi, and the fourth a function relating to the planet's latitude (it is sometimes identified as da<kṣiṇa>, "southern," or u<ttara>, "northern"). This last function reaches its maximum near opposition. For Mars that maximum is 338;24 at N = 24, k = 24; the longitude of Mars' node according to the Brāhmapakṣa is 338°. The longitudes of the planet's heliacal risings and settings are given to the right of the table.
Manuscripts: RAS Tod 36c. ff. 1r–7v.

10. Table of the true longitudes of Mercury set up as is table 9
Manuscripts: RAS Tod 36c. ff. 7v–14r.

11. Table of the true longitudes of Jupiter set up as is table 9
Manuscripts: RAS Tod 36c. ff. 14v–17v.

The *Laghukhecarasiddhi* of Śrīdhara.

I. The Life of Śrīdhara.

Verses 1 and 2 of the *Laghukhecarasiddhi* tell us the author's name, correctly inform us of the fact that he follows the Brāhmapakṣa, and state that the epoch of his treatise is Śaka 1149 = A.D. 1227.

nārāyaṇaṃ śrīdhṛtapādapadmaṃ
pārāyaṇaṃ puṇyavatāṃ praṇamya /
śrībrahmasiddhāntasamāṃ karomi
śrīśrīdharaḥ khecarasiddhim alpām // 1 //

nandābdhirudronaśako'rkaṇighnaś
caitrādimāsair yug adho'ṣṭayuktaḥ /
svabhūrasāṃśena viyug radāpto
yuto'dhimāsaiḥ ghaguṇaghna āḍhyāḥ //2//

The last verse, numbered 20, and the colophon add little to this information:

pāṭīkuṭṭakabījagolasahitān (gaṇitān) paitāmahādīn vayaṃ
siddhāntād api manmahe pratidinaṃ kheṭān nanu prasphuṭān /
ity ākarṇya vidāṃ vacāṃsi kṛpayā śrīśrīdharaḥ prasphuṭāṃ
cakre khecarasiddhim indudhavalāṃ satkīrtivallīm iva //20//

iti śrīgaṇakacakracūḍāmaṇiśrīśrīdharācāryaviracitā
laghukhecarasiddhiḥ samāptā /

II. Manuscripts.

*IO 2408b. 9ff. Copied in Saṃ. 1611, Śaka 1477 = A.D. 1555.

Baroda 3094. 2ff. Copied in Saṃ. 1971 = A.D. 1914.

AS Bengal 6842 (G 10081). 3ff.

Oudh XX (1888) VIII 69. 114pp. Property of Paṇḍita Pratāpa Nārāyaṇa of Allahabad Zila.

Oudh XX (1888) VIII 71. 16pp. Property of Paṇḍita Pratāpa Nārāyaṇa of Allahabad Zila.

Oudh XXI (1889) VIII 6. 12pp. Property of Paṇḍita Vindhyeśvarī Prasāda of Gonda Zila.

III. Tables.

A. The tables of the planets' mean motion give four elements: the kṣepaka or epoch longitude to the second; the mean motion in 1, 10, and 100 years of 365 days each; the mean motion in 1, 10, and 100 days; and the apogee (the apogee is naturally eliminated from the lunar tables). The epoch longitudes indicate the date 20 March 1227:

	mean sidereal longitudes	true tropical longitudes	differences
Sun	353,28,30°	6°	-13°
Moon	13;49,13	25	-11
Lunar apogee	127;40,30		
Lunar node	-60;32,18	-49	-11
Mars	26;1,15	31	-5
Mercury's conjunction	71;12,48	(Mercury) 19	
Jupiter	321;32.30	334	-13
Venus' conjunction	126;15,31	(Venus) 50	
Saturn	301;59,15	315	-13

The (approximate) mean daily motions and apogees of the planets in these tables are:

	mean daily motions	apogees
Sun	0;59, 8,10,11,...°	77;56,16°
Moon	13;10,34,52,26,...	
Lunar apogee	0; 6,40,53,56,...	
Lunar node	-0; 3,10,48,25,...	
Mars	0;31,26,28, 9,...	128;24,48
Mercury's conjunction	4; 5,32,20,55,...	224;54,33
Jupiter	0; 4,59, 8,54,...	172;34,34
Venus' conjunction	1;36, 7,43,51,...	81;16,40
Saturn	0; 2, 0,23,15,...	238;16, 4

The differences between these (approximate) mean motions and those of the Brāhmapakṣa are due to the fact that Śrīdhara's longitudes are given only in signs, degrees, minutes, and seconds; sexagesimal fractions beyond the third place that are squeezed from them are not accurate.

1. Table of the mean motion of the Sun.
Manuscripts: IO 2408b. f. 5r.

2. Table of the mean motion of the Moon.
Manuscripts: IO 2408b. f. 5r.

3. Table of the mean motion of the lunar apogee.
Manuscripts: IO 2408b. f. 5r.
4. Table of the mean motion of the lunar node.
Manuscripts: IO 2408b. f. 5r.
5. Table of the mean motion of Mars.
Manuscripts: IO 2408b. f. 5r.
6. Table of the mean motion of Mercury's conjunction.
Manuscripts: IO 2408b. f. 5r.
7. Table of the mean motion of Jupiter.
Manuscripts: IO 2408b. f. 5v.
8. Table of the mean motion of Venus' conjunction.
Manuscripts: IO 2408b. f. 5v.
9. Table of the mean motion of Saturn.
Manuscripts: IO 2408b. f. 6r.
10. Table of the longitudes of the planets' nodes.

B. In the tables of the equations of the planets the entries in the column of arguments increase constantly by 10°. These equations deviate somewhat from those of the Brāhmapakṣa.

Mars	338;6 ,15°
Mercury	338;50,52
Jupiter	277;58,46
Venus	300;15,5
Saturn	256;49,38

11. Table of the equation of the center for the Sun; the maximum is 2;10,34° at 90°.
Manuscripts: IO 2408b. f. 6r.
12. Table of the equation of the center for the Moon; the maximum is 5;2,17° at 90°.
Manuscripts: IO 2408b. f. 6r.
13. Table of the equation of the center for Mars; the maximum is 11;12,47° at 90°.
Manuscripts: IO 2408b. f. 6v.
14. Table of the equation of the center for Mercury; the maximum is 4.2,0° at 90°.
Manuscripts: IO 2408b. f. 6v.
15. Table of the equation of the center for Jupiter; the maximum is 5;16,0° at 90°.
Manuscripts: IO 2408b. f. 6v.

16. Table of the equation of the center for Venus; the maximum is 1;26,0° at 90°.
Manuscripts: IO 2408b. f. 6v.

17. Table of the equation of the center for Saturn; the maximum is 7;59,0° at 90°.
Manuscripts: IO 2408b. f. 7r.

18. Table of the equation of conjunction for Mars; the maximum is 41;17,16° at 130°.
Manuscripts: IO 2408b. f. 7r.

19. Table of the equation of the conjunction for Mercury; the maximum is 21;30,0° at 110°.
Manuscripts: IO 2408b. f. 7v.

20. Table of the equation of the conjunction for Jupiter; the maximum is 10; 53,0° at 100°.
Manuscripts: IO 2408b. f. 7v.

21. Table of the equation of the conjunction for Venus; the maximum is 46;23,0° at 140°.
Manuscripts: IO 2408b. f. 8r.

22. Table of the equation of the conjunction for Saturn; the maximum is 5;34,0° at 100°.
Manuscripts: IO 2408b. f. 8r.

23. Table of the elongations from the Sun necessary for the occurrence of the Greek-letter phenomena of the planets. There is a separate table for each planet in the original.

	Γ	Φ	Σ	Ξ	Ψ	Ω
Mars	28°	163°			196;53°	332°
Mercury	205	215	310°	50°	145	155
Jupiter	14	125			235	346
Venus	183	195	336	24	165	177
Saturn	17	113			247	343

Manuscripts: IO 2408b. ff. 8v–9r.

The *Śīghrasiddhi* of Lakṣmīdhara.

I. The Life of Lakṣmīdhara.

Our unique source of information on Lakṣmīdhara is the first verse of the *Śīghrasiddhi*:

śrīherambaṃ praṇamyābhilaṣitaphaladaṃ vyālayajñopavītaṃ
śabdabrahmasvarūpam abhimataphaladāṃ śrīgiraṃ śrīguruṃ
ca/
śrīmantau puṣpavantau tribhuvananayane vaijadevasya sūnur
vakṣye lakṣmīdharākhyo matayugalamatāṃ sāraṇīṃ śīghrasid-
dhiṃ // 1 //

From this we learn that he was the son of Vaijadeva. The epoch of his work, Śaka 1200 = A.D. 1278, is given in verse 4:

śāko dvādaśabhiḥ śatair virahitaḥ syād abdavṛndābhidho
nighno'sau śaśibhūmibhis trisahito'dhaḥstho rasendrānvitaḥ /
dviṣṭho dvyagniśaroddhṛtaḥ phalayuto'bhrātyaṣṭihṛl labdha-
yuk
chuddhisthā tithipūrvikā khadahanair bhaktāvaśeṣonmitā
// 4 //

The bhogakṣepa in tables 1 and 3 is said to be for godātīra in BM Add. 14,366, and in the same manuscript at table 5 the akṣabhā or noon equinoctial shadow is given as 4;20 digits and the ayanāṃśa or precession as 16;30°. These data indicate that Lakṣmīdhara wrote on the banks of the Godāvarī at c. 20° N; the ayanāṃśa points to c. 1600, the date of the scribe Janārdana.

II. Manuscripts:

*BM Add. 14,366. 38ff. Copied in Śaka 1544 = A.D. 1622.

*Oxf. SC c. 319b (3347). A 3ff.; B 22ff.; C 1f. Copied in Śaka 1560 = A.D. 1639.

GVS 2932 (2166). 6ff. Copied in Saṃ. 1749 = A.D. 1692.

Anup 5204. 1f.

III. Tables:

The basic tables in Lakṣmīdhara's work are tithi, nakṣatra, and yoga tables according first to the Brāhmapakṣa and then to the Āryapakṣa. The set-up of the tables is similar to that of the *Pañcāṅgavidyādharī* of Vidyādhara and the Anonymous of 1741 (*SATIUS*, pp. 67a–68b).

1. Table of tithikendras (modulo 27;59,33) according to the Brāhmapakṣa for 1 to 39 periods of 10 days; the effect of the varia-

tion in solar motion is taken into consideration. There are 8 columns: column 1 gives avadhis 1 to 39; column 2, the tithikendra kṣepas; column 3, cālakas in palas; column 4, bhogakṣepas; column 5, negative cālakas in ghaṭīs; column 6, negative śeṣaphalas; column 7, chedas; and column 8, dhruvakṣepas, which are 10 days modulo 30. Cf. table 5 of the *Pañcāṅgavidyādharī* and toble 11 of the Anonymous of 1741.

Manuscripts: BM Add 14,366 ff. 13r–13v; Oxford CS c. 319b. B ff. 1r–1v.

2. Table of nakṣatrakendras (modulo 27;13,49) according to the Brāhmapakṣa for 1 to 42 periods of 9 days. There are 6 columns corresponding to columns 1 (avadhis 1 to 42), 2, 4, 5 (positive), and 8 (9 days modulo 27) of table I. Cf. table 6 of the *Pañcāṅgavidyādharī* and table 12 of the Anonymous of 1741.

Manuscripts: BM Add. 14,366 ff. 14r–14v; Oxford CS c. 319b. B ff. 8r–8v.

3. Table of yogakendras (modulo 29;16,1) according to the Brāhmapakṣa for 1 to 46 periods of 9 days; the effect of the variation in solar motion is taken into consideration. There are 8 columns corresponding to those in table 1 (the dhruvakṣepa increased by 9 days modulo 27). Cf. table 7 of the *Pañcāṅgavidyādharī* and table 13 of the Anonymous of 1741.

Manuscripts: BM Add. 14,366 ff. 15r–15v; Oxford CS c. 319b. B ff. 15r–15v.

4. Table of tithikendras (modulo 27;59,33) according to the Āryapakṣa for 1 to 39 periods of 10 days. There are 8 columns as in table 1; the tithikendras in table 4 are identical with those in table 1, but the bhogakṣepas differ.

Manuscripts: BM Add. 14,366 ff. 16r–16v; Oxford CS c. 319b. B ff. 2r–2v.

5. Table of nakṣatrakendras (modulo 27;13,49) according to the Āryapakṣa for 1 to 42 periods of 9 days. There are 6 columns as in table 2; the nakṣatrakendras in table 5 are identical with those in table 2, but the bhogakṣepas differ.

Manuscripts: BM Add. 14,366 ff. 17r–17v; Oxford CS c. 319b. B ff. 9r–9v.

6. Table of yogakṣepas (modulo 29;16,1) according to the Āryapakṣa for 1 to 46 periods of 9 days. There are 8 columns as in table 3; the yogakendras in table 6 are identical with those in table 3, but the bhogakṣepas differ.

Manuscripts: BM Add. 14,366 ff. 18r–18v; Oxford CS c. 319b. B ff. 16r–16v.

7. Table of corrections to the tithi for 0 to 27 days horizontal, and for 0 to 59 ghaṭikās vertical. The maximum correction is 24;47. This is table 9 of the *Pañcāṅgavidyādharī*.

Manuscripts: BM Add. 14,366 ff. 19r–24v; Oxford CS c. 319b. B ff. 3r–7v.

8. Table of corrections to the nakṣatra for 0 to 27 days horizontal, and for 0 to 59 ghaṭikās vertical. The maximum correction is 22;56. This is table 10 of the *Pañcāṅgavidyādharī*.

Manuscripts: BM Add. 14,366 ff. 25r–30v; Oxford CS c. 319b B ff. 10r–14v.

9. Table of corrections to the yoga for 0 to 29 days horizontal, and for 0 to 59 ghaṭikās vertical. The maximum correction is 21;20. This is table 11 of the *Pañcāṅgavidyādharī*.

Manuscripts: BM Add. 14,366 ff. 31r–36v; Oxford CS c. 319b. B ff. 17r–21v.

10. Table entitled: sūkṣmarkṣāṇi, i.e. "small constellations." The horizontal argument is 1 to 28 nakṣatras, the vertical argument 55 to 66 ghaṭikās (the time required for the Moon to pass through 1 nakṣatra or 13;20°). The entry for nakṣatra 28 is always 0;0. The significance of the table remains obscure; the entries for 60 ghaṭikās, when the Moon's daily progress is 13;20°, are:

1.	0,45	8.	6,1	15.	42,56	22.	4,31
2.	33,8	9.	38,24	16.	12,3	23.	3,46
3.	33,53	10.	37,10	17.	12,49	24.	3,1
4.	3,1	11.	37,55	18.	45,11	25.	29,22
5.	3,46	12.	9,3	19.	45,56	26.	30,7
6.	36,10	13.	9,48	20.	46,42	27.	0,45
7.	5,16	14.	10,33	21.	15,50	28.	0,0

Manuscripts: BM Add. 14,366 ff. 37r–37v.

11. Table of the week-days on which the Sun enters the nakṣatras. BM Add. 14,366 (A) gives 32 nakṣatras and adds an unexplained column here called c; Oxford CS c. 319b (B) gives 29 nakṣatras and adds a column giving the lengths of daylight (the maximum is 33;10 ghaṭikās at Punarvasu, the minimum 26;50 ghaṭikās at Pūrvāṣāḍhā), another giving cālakas in palas, another giving vārapravṛttis here called d, and a last giving cālakas in palas.

a	b	c	d
Aśvinī	4;49,48	--33	7
Bharaṇī	4;30,54	—33	27
Kṛttikā	4;18,43	--25	46
Rohiṇī	4;12,33	22	61
Mṛgaśiras	4;11,12 A, 4;11,11 B	22-1	74
Ārdrā	4;13,8	19	81
Punarvasu	4;16,30	19	83
Puṣya	4;19,42	21	72
Āśleṣā	4;20,20	23	69
Maghā	4;17,15	26	54
Pūrvaphālgunī	4;8,51	32	27
Uttaraphālgunī	3;54,15	45	18
Hasta	3;32,22	73	1
Citra	3;3,28	106	21
Svāti	2;27,34	333	40
Viśākhā	1;45,6	+84	60
Anurādhā	0;57,3	62	77
Jyeṣṭhā	0;4,26	49	92
Mūla	6;8,32	43	102
Pūrvāṣāḍhā	5;10,46 B, 6;10,46 A	43	107
Uttarāṣāḍhā	4;12,37	43	106
Apra	0;1,47	—	00
Śravaṇa	3;15,31	56	99
Dhaniṣṭhā	4;10,54	—	00
Śatabhiṣak	2;20,57	73	86
Īrā	1;30,10 A, 1;30,20 B	137	71
Pūrvabhādrapadā	0;44,22	+0	52
Uttarabhādrapadā	0;4,29	117	(torn)
Revatī	6;31,23 A, 6;3-,2- B (torn)	—	(torn)
Aśvinī	6;5,19 A	—	—
Bharaṇī	6;46,25 A	—	—
Kṛttikā	6;34,24 A	—	—

Manuscripts: BM Add. 14,366 f. 38r; Oxford CS c. 319b. B f. 22r.

12. Table of week–days on which the Sun enters the zodiacal signs. BM Add. 14,366 adds a function analogous to c in table 11.

Aries	4;49,48	—33	Libra	2;46,20	+244
Taurus	0;46,39	22	Scorpio	4;39,32	57
Gemini	4;11,50	20	Sagittarius	6;8,32	43
Cancer	0;48,56	19	Capricorn	0;28,11 A, 0;28,1 B	53
Leo	4;17,15	26	Aquarius	1;55,0 B, 0;55.0 A	256
Virgo	0;19,26	68	Pisces	3;43,33	84

Manuscripts; BM Add. 14,366 f. 38v; Oxford CS c. 319b. B f. 22v.

13. Table of yearly parameters for various functions. This is virtually table 3 of the *Pañcāṅgavidyādharī*.

śuddhi	11; 3,53	tithibhoga	1;11,42
abdapa	1;15,31	nakṣatrabhoga	1;18, 3
mandatithi	7;40,30	yogabhoga	1;17,52
tithidhruva	10;56, 7	tithikendra	7; 5,59
nakṣatradhruva	10; 2,31	nakṣatrakendra	7; 0,29
yogadhruva	10; 2,31	yogakendra	7;31,46

Manuscripts: BM Add. 14,366 f. 38v.

14. Table of yearly parameters and kṣepakas; those for the planets are expressed in terms of tables such as those of the *Mahādevī*.

	guṇakas	mean yearly motions
Epact	11; 3,53,24 tithis	
Lord of the year	1;15,31,30 days	
Mars	31;54, 4,31 (× 6°)	3,11;24,27, 6°
Mercury's anomaly	9; 7,30,22	54;45, 2,12
Jupiter	5; 3,30,40	30;21, 4, 0
Venus' anomaly	37;32, 5.29	3,45;12,32,54
Saturn	2; 2, 8,30	12;12,51, 0
Lunar node	19;21,30,50°	

The kṣepakas indicate that the epoch date is Tuesday 3 March 1618. This table, then, if not the others, is due to Janārdana.

	kṣepaka		mean sidereal longitude		true tropical longitude	difference
Epact	14;57,23,6 (× 12)	(Moon)	2,59;28,37°		198°	—19°
Lord of the year	2;49,16,30					
Mars	58;21,45,20 (× 6°)		5,50;10,32		357	— 7
Mercury's anomaly	44;52,41.30		4,29;16.9	(Mercury)	342	

Jupiter	51;15,32,10	5, 7;33,13		324	—16
Venus' anomaly	57;38,50,0	5,45;53,0	(Venus)	338	
Saturn	7; 7,40,40	46;46,4		50	— 3
Lunar node	—1; 0, 2,16	4,59;57,44		309	— 9

Manuscripts: Oxford CS c. 319b. B. f. 22v.

The *Mahādevī* of Mahādeva.

This work, whose epoch is Śaka 1238 = A.D. 1316, has been discussed by O. Neugebauer and D. Pingree, "The Astronomical Tables of Mahādeva," *PAPhS* 111, 1967, 69–92, and in *SATIUS*, pp. 37a–39a. The manuscripts of it described in this catalogue are:

*RAS Tod 24. 63ff. Copied in Saṃ. 1776 = A.D. 1719.
*RAS Tod 45. Ff. 1 and 1bis–77. Copied in Saṃ. 1789, Śaka 1654 = A.D. 1732.
*CUL Add. 2557. Ff. 1–114, 126–128, 141–143, and 149–151. Copied in Saṃ. 1823 = A.D. 1766.
*RAS Tod 36g. 76ff.

The *Kāmadhenu* of Mahādeva.

I The Life of Mahādeva.

Mahādeva gives his genealogy in verse 30 of the *Kāmadhenu*:
āsīt kauṇḍinyagotre dvijakulatilako bopadevābhidhānaḥ
śrautasmārtārthayukto nṛpaharipadayugmārādhakānām abhīṣṭaḥ /
tajjaś cakre pareśe sudṛḍhadhṛtimatiḥ śrīmahādevanāmā
godāyāṃ tryambakākhye nṛpasadasī mataḥ kāmadhenuṃ
subodhāṃ // 30 //

From this it appears that Mahādeva was the son of Bopadeva, a Brāhmaṇa of the Kauṇḍinyagotra, and that he composed the *Kāmadhenu* at Tryambaka (Trimbak in Mahārāṣṭra, 20 miles south-west of Nasik) on the Godāvarī. He and his father were connected with a court, which must have been that of the Rāṣṭrauḍha Rājā of Baglāna who had been independent of the Delhi Sultāns since ca. 1345; that rājā was probably Ekadeva, the son of Nānadeva.

Mahādeva's epoch is given as Śaka 1279=A.D. 1357 in verse 3:
navādryarkonaśākaghnā guṇāḥ kṣepayutā dhruvāḥ /
śuddhyabdādhipakendrāṇāṃ madhyārkabhagaṇādijāḥ // 3 //

II. Manuscripts:

LDI 6700 (1491). 1f. Copied in Saṃ. 1527 = A.D. 1471.
Baroda 3086. 2ff. Copied in Saṃ. 1714 = A.D. 1657.
Anup 4473. 17ff.
Anup 4474. 18ff.
Anup 4475. 5ff.
Anup 4476. 6ff.
Anup 4728. 5ff.
AS Bombay 242. 11ff.
*RAS Tod 36f. Ff. 1–24.

III. Tables.

1. Table of corrections to the tithikendra with hāras for 0 to 27 avadhis (avadhis here are days). The maximum is 24;40 at avadhis 7 (positive) and 21 (negative).

Manuscripts: RAS Tod 36f. f. 2r.

2. Table of corrections to the nakṣatrakendra with hāras for 0 to 27 avadhis. The maximum is 23;48 at avadhi 6 (positive) and 22;54 at avadhi 21 (negative).

Manuscripts: RAS Tod 36f. f. 2r.

3. Table of corrections to the yogakendra with hāras for 0 to 29 avadhis. The maximum is 21;19 at avadhi 7 (positive) and 21;16 at avadhi 222 (negative).

Manuscripts: RAS Tod 36f. f. 2r.

4. Table of the length of daylight when the Sun is in each nakṣatra, with a cālaka.

	dinamāna	cālaka	differences of dinamāna
Aśvinī	30;46	3,30	+0;36
Bharaṇī	31;44	2,25	0;58
Kṛttikā	32;22	2,44	0;38
Rohiṇī	33;0	1,34	0;38
Mṛgaśiras	33;22	1,8	0;22
Ārdrā	33;38	0,8	+0;16
di 7	0,1 ½	1 ½	—
Punarvasu	33;240 (33;40)	0,8	+0;2
Puṣya	33;24	1,25	−0;16 (!)

Āśleṣā	33;4	2,43	0;20
Maghā	32;26	2,44	0;38
Pūrvaphālgunī	31;0	3,39	1;26 (!!)
Uttaraphalgunī	31;0	3,22	0;0
Hasta	30;14	3,24	0;46 (!)
Citra	29;28	3,34	0;42
Svāti	28;40	3,9	0;48
Viśākhā	27;58	3,1	0;42
Anurādhā	27;18	2,45	0;40
Jyeṣṭhā	26;44	1,14	0;34
Mūla	26;20	1,13	0;24
Pūrvāṣāḍhā	26;14	1,4	−0;10
Uttar āṣāḍhā	26;28	1,13	+0;14
di 26	12,1,13	½	—
Śravaṇa	26;44	2,28	0;16
Dhaniṣṭhā	27;16	2,53	0;32
Śatabhiṣak	27;54	3,26	0;38
<Pūrvabhādrapadā	—	—>	
Uttarabhādrapadā	29;22	3,33	} 1;28
di 11,30	0	3,14	
Revatī	30;10	3,23	0;48

Manuscripts: RAS Tod 36f. f. 2v.

5. Table of vārapravṛtti (day-beginnings) for the nakṣatras was cālakas. The vārapravṛtti is the equivalent of the catuṣṭaikya—i.e., the sum of half the equation of daylight, the deśāntara, and the equation of time.

Aśvinī	− 2	1,24	Svāti	70	1,35
Bharaṇī	+22	1,31	Viśākhā	91	1,30
Kṛttikā	41	1,21	Anurādhā	111	1,18
Rohiṇī	60	0,47	Jyeṣṭhā	128	0,32
Mṛgaśiras	[2]79 (71)	0, 4<2>	Mūla	143	0,32
Ārdrā	[1]71 (79)	0,34	Pūrvāṣāḍhā	143	0,37
Punarvasu	80	0,34	Uttarāṣāḍhā	136	0,37
Puṣya	72	0,42	Śravaṇa	128	0,13
Āśleṣā	62	1,21 (47)	Dhaniṣṭhā	112	1,27
Maghā	43	1,21	Śatabhiṣak	93	1,35
Pūrvaphālgunī	+24	1,44	Pūrvabhādrapadā	72	1, 3
Uttaraphālgunī	0	1,41	Uttarabhādrapadā	49	1,47
Hasta	−23	1,42	Revatī	25	1,41
Citra	46	1,47			

Manuscripts: RAS Tod 36f. f. 2v.

6. Table of sūkṣmanakṣatracālakas and palas.

	cālaka	palāni		cālaka	palāni
Aśvinī	0,39	0,42	Svāti	36,52	40,14
Bharaṇī	28,28	31,30	Viśākhā	10,21	11,17
Kṛttikā	29, 7	31,41	Anurādhā	11, 0	12, 0
Rohiṇī	2,35	0,50	Jyeṣṭhā	38,50	42,21
Mṛgaśiras	3,34	3,31	Mūla	39,28	43,35
Ārdrā	31, 3	33,52	Pūrvāṣāḍhā	40, 7	43,45
Punarvasu	4,31	4,53	Uttarāṣāḍhā	13,35	14,50
Puṣya	5,10	5,38	Śravaṇa	3,34	3,31
Āśleṣā	33, 0	36, 0	Dhaniṣṭhā	2,35	2,50
Maghā	33,38	36,42	Śatabhiṣak	25,14	27,31
Pūrvaphālgunī	34,17	37,24	Pūrvabhādrapadā	25,53	28,13
Uttaraphālgunī	7,46	8,28	Uttarabhādrapadā	0,39	0,42
Hasta	8,25	9,10	Revatī	0, 0	0, 0
Citra	9, 4	9,53			

Manuscripts: RAS Tod 36f. f. 2v.

7. Table entitled sūryanakṣatrāntaraghaṭī ("ghaṭikās of the interval between the Sun and the nakṣatras").

Aśvinī	800	<8>21	Svāti	700	<6>97
Bharaṇī	800	28	Viśākhā	700	92
Kṛttikā	800	24 (34)	Anurādhā	700	87
Rohiṇī	800	39	Jyeṣṭhā	700	84
Mṛgaśiras	800	42	Mūla	700	82
Ārdrā	800	44	Pūrvāṣāḍhā	700	82
Punarvasu	800	43	Uttarāṣāḍhā	700	82
Puṣya	800	41	Śravaṇa	700	86
Āśleṣā	800	37	Dhaniṣṭhā	700	88
Maghā	800	31	Śatabhiṣak	700	94
Pūrvaphālgunī	800	25	Pūrvabhādrapadā	800	<80>1
Uttaraphālgunī	800	18	Uttarabhādrapadā	800	8
Hasta	800	11	Revatī	800	13
Citra	800	4			
				21,600	367;24 days

Manuscripts: RAS Tod 36f. f. 3r.

8. Table of accurate tithikendras for 1 to 13 months with cālakas measured in palas. I add a column of differences.

	tithikendras	cālakas	differences
1.	0;10,38	——	
2.	2;8,38	– 8	1;58,0
3.	4;4,34	11	1;55,56
4.	5;59,34	9	1;55,0
5.	7;55,1	6	1;55,27
6.	9;52,11	– 1	1;57,10
7.	11;51,53	+ 5	1;59,42
8.	13;54,18	9	2;2,25
9.	15;58,58	11	2;4,40
10.	18;4,47	11	2;5,49
11.	20;10,24	8	2;5,37
12.	22;14,32	+ 3	2;4,8
13.	24;16,14	– 3	2;1,42

Manuscripts: RAS Tod 36f. f. 3v.

9. Table of the week–days on which the tithis begin for 1 to 13 months; the rāmabīja is included. Cālakas are also given.

	vāras	cālakas
1.	0;10,28	–0,59
2.	1;40,52	1, 7
3.	3;8,42	1, 7
4.	4;35,4	1, 7
5.	6;1,32	1, 3
6.	7;29,43	0,58
7.	2;0,10	0,53
8.	3;33,49	0,49
9.	5;9,1	0,47
10	6;45,23	0,48
11.	1;22,6	0,51
12.	2;58,12	0,56
13.	4;3,18	0,57

Manuscripts: RAS Tod 36f. f. 3v.

10. Table of yearly parameters according to the Āryapakṣa. Cf. table 21

Epact	11;3,53,22,39 tithis
Lord of the Year	1;15,31,15,0 days
Tithikendra	7;9,41,52,24

Manuscripts: RAS Tod 36f. f. 3v.

11. Table of epoch positions. Cf. table 22.

Epact	7;59,58,1,2 tithis
Lord of the Year	3;14,44,16,0 days
Tithikendra	5;16,15,17,54

Manuscripts: RAS Tod 36f. f. 3v.

12. Table of corrections for the tithi for 0 to 27 days horizontal and for 1 to 60 ghaṭīs vertical; the table is normed so as to be always positive by the addition of 1 day to all entries. The maximum is 1;24,47 at day 6, ghaṭīs 34 to 37; the minimum 0;35,13 at day 21, ghaṭīs 23 to 27.

Manuscripts: RAS Tod 36f. ff. 4r–9v.

13. Table of week–days on which the Sun enters each of the 27 nakṣatras, identical with column 1 of table 4 of the Anonymous of 1594 (*SATIUS*, pp. 54a–55a).

Aśvinī	4;49,28	Svāti	2;27,20
Bharaṇī	4;30,37	Viśākhā	1;44,56
Kṛttikā	4;18,26	Anurādhā	0;56,52
Rohiṇī	4;12,20	Jyeṣṭhā	0; 4,15
Mṛgaśiras	4;11,0	Mūla	6; 8,21
Ārdrā	4;13,2	Pūrvāṣāḍhā	5;10,34
Punarvasu	4;16,26	Uttarāṣāḍhā	4;12,22
Puṣya	4;19,26	Śravaṇa	3;15,12
Āśleṣā	4;20,21	Dhaniṣṭhā	2;20,36
Maghā	4;17,10	Śatabhiṣak	1;29,48
Pūrvaphālgunī	4; 8,47	Pūrvaphālgunī	0;44,21
Uttaraphālgunī	3;53,54	Uttaraphālgunī	0; 4,11
Hasta	3;32,23	Revatī	6;31,4
Citra	3; 3,17		

Manuscripts: RAS Tod 36f. f. 10r.

14. Table of week–days on which the Sun enters each of the 12 zodiacal signs.

Aries	4;49,28	Leo	4;17,10	Sagittarius	6; 8,21
Taurus	0;46,23	Virgo	0;19,12	Capricorn	0;27,55
Gemini	4;11,44	Libra	2;46,12	Aquarius	1;54,42
Cancer	0;48,52	Scorpio	4;39,22	Pisces	4;43,33

Manuscripts: RAS Tod 36f. f. 10r.

15. Table of the nakṣatrakendras for 1 to 14 sidereal months. The monthly difference computed from months 2 to 13 is 0;13,48,27, . . . ; from 2 to 14 it is 0;13,47,40.

1.	0; 0,0	8.	25;37,9
2.	27; 0,0	9.	25;23,21
3.	26;46,12	10.	25; 9,33
4.	26;32,23	11.	24;55,44
5.	26;18,35	12.	24;41,55
6.	26; 4,46	13.	24;28,7
7.	25;50,58	14.	24;14,28

Manuscripts: RAS Tod 36f. f. 11r.

16. Table of the week–days on which nakṣatras begin with their cālakas for 1 to 14 sidereal months.

1.	0; 0,0	+45	8.	2;15,0	41
2.	6;20,13	44	9.	1;33,45	41
3.	5;40,0	42	10.	0;52,15	41
4.	4;59,12	42	11.	0;11,2	43
5.	4;18,10	42	12.	6;30,19	44
6.	3;37,3	42	13.	5;50,13	45
7.	2;56,3	42	14.	5;10,27	+45

Manuscripts: RAS Tod 36f. f. 11r.

17. Table of yogakendras with their cālakas for 1 to 15.

1.	29; 6,27	+ 4	6.	18; 3,8	5	11.	4;36,5	9
2.	26;52,12	12	7.	15;39,13	+ 1	12.	4;16,50	8
3.	24;39,25	14	8.	13;33,35	− 3	13.	1;57,8	5
4.	22;27,30	18	9.	11;16,0	7	14.	28;54,44	− 2
5.	20;15,40	8	10.	8;57,6	9	15.	26;38,3	+ 2

Manuscripts: RAS Tod 36f. f. 11r.

18. Table of week–days on which yogas begin with their cālakas for 1 to 15.

1.	6;50,58	−3,25	6.	1;13,33	3,26	11.	2;11,41	3.40
2.	4;18,43	3,22	7.	5;40,26	3,30	12.	6;31,29	3,38
3.	1;47,30	3,22	8.	3; 5,46	3,34	13.	3;54,22	3,34
4.	6;16,36	3,22	9.	5;29,11	3,36	14.	1;17,54	3,30
5.	3;45,26	3,24	10.	4;50,57	3,40	15.	5;43,23	−3,26

Manuscripts: RAS Tod 36f. f. 11r.

19. Table of corrections for the nakṣatras for 0 to 27 days horizontal and for 0 to 59 ghaṭikās vertical; the table is normed so as to be always positive by the addition of 1 day to each entry. The maximum is 1;22,56 at day 6, ghaṭīs 25 to 29; the minimum 0;37,4 at day 20, ghaṭīs 47 to 50.

Manuscripts: RAS Tod 36f. ff. 11v–17r.

20. Table of corrections for the yoga for 0 to 29 days horizontal, and 0 to 59 ghaṭīs vertical; the table is normed so as to be positive by adding 1 day to each entry. The maximum is 1;21,22 at day 6, ghaṭīs 59; the minimum 0;38,40 at day 22, ghaṭīs 16 to 24. Manuscripts: RAS Tod 36f. ff. 17v–23r.

21. Table of yearly parameters. Cf. table 10.

Epact	11; 3,53,22,39 tithis
Lord of the Year	1;15,31,15, 0 days
Tithi	7; 9,41,52,24
Nakṣatra	6;58, 0,14,23
Yoga	7;29,15,56,13

Manuscripts: RAS Tod 36f. f. 23v.

22. Table of epoch positions. Cf. table 11.

Epact	7;59,58, 1, 2 tithis
Lord of the Year	3;14,44,16, 0 days
Tithi	5;16,15,17,54
Nakṣatra	5; 7,38,54, 1
Yoga	5;30,39,24,7

Manuscripts: RAS Tod 36f. f. 23v.

The *Kalpalatā*.

I. *The Kalpalatā*

The *Kalpalatā* is a short anonymous astronomical text consisting of three chapters; a pañcāṅgaprakaraṇa, a candragrahaṇa, and a sūryagrahaṇa. The first verse gives its epoch date as Śaka 1281= A.D. 1359.

śāko bhūgajabhāskarair virahito'tyaṣṭyāhato 'dhaḥsthito
yukto devaguṇair adho'mṛtakaraprāṇendudasrair yutaḥ/
bhakto'sau turagāśakuñjarakhagair labdhona ūrdhvo hṛto
nāgābhrābdhibhir āptayug bhavahṛtaḥ śeṣaṃ bhavṛndaṃ
bhavet //1//.

II. Manuscripts:
*IO 2464a. 28ff.

III. Tables

1. Table of tithis in 6 columns. Column 1 gives 0 to 12 synodic months, column 2, the tithikendras modulo co 27;59,33, column 3,

an unexplained function, column 4 repeats column 1, column 5 gives the week-days, and column 6, the "gatadhanāni." I give below columns 1, 2, 3, 5, and 6.

1.	0	1	2	3	4	5	6
2.	5;44,39	7;42,42	9;38,38	11;33,40	13;29,10	15;26,21	17;36, 3
3.	0;59,56	0;59,52	0;59,50	0;59,51	0;59,54	0;59,59	1; 0, 5
5.	5;56,18	0;26,51	1;54,45	3;21, 4	4;47,28	6;15,33	0;43,11
6.	59, 1	58,56	58,53	58,53	58,56	59, 1	59, 6

1.	7	8	9	10	11	12
2.	19;28,21	21;33,12	23;39, 3	25;44,44	27;48,54	1;50,38
3.	1; 0, 9	1; 0,12	1; 0,11	1; 0, 8	1; 0, 3	0;59,58
5.	2;19,20	3;54,23	5;30,44	0; 7,37	1;43,47	3;18, 5
6.	59,10	59,13	59,14	59,12	59, 9	59, 5

Manuscripts: IO 2464a. f. 4r.

2. Table of corrections of the tithi for 0 to 13 days horizontal and for 0 to 59 ghaṭikās vertical. The maximum correction is 24;44 ghaṭikās at day 7, ghaṭikās 0 to 3.

Manuscripts: IO 2464a. ff. 4v–11v.

3. Table of nakṣatras in 6 columns. Columns 1 and 4 give 0 to 13 sidereal months, column 2, the nakṣatrakendras, column 3, an undefined function, here a constant 61,42 column 5, the week-days, and column 6 another undefined function. I give below a copy of columns 1, 2, 5, and 6.

1.	0	1	2	3	4	5	6
2.	5;34, 0	5;19,48	5; 5,36	4;51,24	4;37,12	4;23, 0	4; 8,48
5.	5;45,52	5; 6,12	4;26, 3	3;45,16	3; 4, 8	2;22,54	1;41,49
6.	60,45	60,44	60,43	60,42	60,42	60,42	60,42

1.	7	8	9	10	11	12	13
2.	3;54,37	3;40,25	3;26,13	3;12, 1	2;57,49	2;43,37	2;19,25
5.	1; 0,37	0;19,12	6;37,38	5;56,23	5;15,49	4;35,52	3;56,19
6.	60,41	60,41	60,42	60,43	60,45	60,45	60,46

Manuscripts: IO 2464a. f. 12r.

4. Table of corrections of the nakṣatra for 0 to 13 days horizontal and for 0 to 59 ghaṭikās vertical. The maximum correction is 22;53 at day 7, ghaṭikās 0 to 3.

Manuscripts: IO 2464a. ff. 12v–19v.

5. Table of yogas in 6 columns. Columns 1 and 4 give 0 to 14, column 2, the yogakendras, column 3, an undefined function, column 5, the week-days, and column 6, an undefined function, I give below a copy of columns 1, 2, 3, 5, and 6.

1.	0	1	2	3	4
2.	5;24,50	3;16,23	1; 9,21	27; 3, 9	24;57, 1
3.	57,28	57,31	57,33	57,33	57,32
5.	5;36,52	3; 4,43	0;33,32	5; 2,37	2;31,24
6.	56,35	56,37	56,38	56,37	56,36
1.	5	6	7	8	9
2.	22;50,14	20;42, 9	18;32,23	16;20,22	14; 7,52
3.	57,29	57,25	57,21	57,18	57,16
5.	6;59,25	4;26,13	1;51,24	6;14,42	3;36,19
6.	56,33	56,29	56,25	56,21	56,19
1.	10	11	12	13	14
2.	11;53,55	9;39,44	7;26, 5	5;13,28	3; 2,51
3.	57,15	57,16	57,19	57,23	57,26
5.	0;57, 2	5;17,55	2;39,53	0; 3,38	4;29,15
6.	56,20	56,22..	56,26	56,30	56,33

Manuscripts: IO 2464a. f. 20r.

6. Table of corrections of yogas for 0 to 13 days horizontal and for 0 to 59 ghaṭikās vertical. The maximum correction is 21;20 at day 6, ghaṭikā 59.

Manuscripts: IO 2646a. ff. 20v–27v.

7. Table of week-days on which the Sun enters each of the 12 zodiacal signs with the corresponding half-equations of daylight expressed in palas.

Aries	3;34,24	+ 26	Libra	1;30,43	− 26
Taurus	6;29,41	78	Scorpio	3;22,22	78
Gemini	2;56,6	111	Sagittarius	4;52,23	111
Cancer	6;35,46	112	Capricorn	6;14,29	112
Leo	3; 5,33	78	Aquarius	0;42,44	78
Virgo	6; 6,21	+ 29	Pisces	2;30,56	− 29

Manuscripts: IO 2464a. f. 28r.

8. Table of week-days on which the Sun enters each of the 27 nakṣatras with the corresponding half-equations of daylight.

Manuscripts: IO 2464a. f. 28r.

9. Table entitled pūspaṃti bhadhṙuva, only partially filled in. There are 16 lines in 2 columns.

Manuscripts: IO 2646a. f. 28v.

10. Table entitled ravikādā.

	prathama	yāmyāyana		<prathama>	saumyāyana
Cancer	− 3	− 6	Capricorn	+ 3	+ 6
Leo	− 8	−10	Aquarius	+ 8	+10
Virgo	−10	−11	Pisces	+10	+11
Libra	−11	−10	Aries	+11	+10
Scorpio	− 8	− 6	Taurus	+ 8	+ 6
Sagittarius	− 3	0	Gemini	+3	0

Manuscripts: IO 2464a. f. 28v.

11. Table of unknown import.

Aries	39	Pisces
Taurus	34	Aquarius
Gemini	27	Capricorn
Cancer	18	Sagittarius
Leo	10	Scorpio
Virgo	4	Libra

Manuscripts: IO 2464a. f. 28.

The *Makaranda* of Makaranda

For this work, composed in Śaka 1400 = A.D. 1478, see *SATIUS*, pp. 39b–46b. The manuscripts of the *Makaranda* described in this catalogue are:

*BM Add. 26,448a. 5ff.
*IO 2476a. 27ff.
*Oxford CS g. 17. Ff. 2–10 and 110–117.

See also commentaries by:

Divākara: *CUL Add. 2455. 11ff.
*IO 2476c. 11ff.

Puruṣottama: *CUL Add. 2430. 8ff. Copied in Saṃ. 1887=A.D. 1830.
*IO 520d. 16ff.

Viśvanātha: *IO 1681b. 26ff. Copied in Saṃ. 1841 = A.D. 1785.
CUL Add. 2407. 27ff. Copied in Saṃ. 1901, Śaka
*CUL Add. 2407. 27ff. Copied in Saṃ. 1901, Śaka 1766 = A.D. 1844.
*IO 2476b. 24ff.
*IO Mackenzie II 48c. 25ff.

Harikarṇa: *BM Add. 26,448a. 5ff.

The *Grahalāghavasāriṇī* I.

I. The *Grahalāghavasāriṇī* I.

This set of tables is based on the *Grahalāghava* of Gaṇeśa, whose epoch is 18 March 1520; cf. the *Grahalāghavīyamadhyamaspaṣṭārkasāriṇī* in *SATIUS*, p. 50b and the *Grahalāghavasāriṇī* II in *SATIUS*, pp. 69a–70a, as well as the *Grahasāraṇī* of Gaṅgādhara described below. Like the Anonymous of 1520 (*SATIUS*, pp. 46b–47b) and the *Grahaprabodhasāriṇī* of Yādava, the *Grahalāghavasāriṇī* I uses dhruvāṅkas of 4016 days in its mean motion tables. One manuscript (Oxford CS d. 774g) begins with dhruvāṅka 1, whose positions indicate the date 17 March 1531, which is 4016 days after 18 March 1520.

	dhruvāñka 1		true tropical longitudes	differences
Sun	5,47;51,49°		6°	—18°
Moon	5,45;19,49		5,53	— 8
Lunar apogee	4,14;48			
Lunar node	—3, 5;12		—2,48	—17
Mars	4,11;36		4,57	—45
Mercury's anom.	2,26; 6	(Mercury)	18	
Jupiter	3, 5;58		3,23	—17
Venus' anom.	3, 6; 7	(Venus)	5,58	
Saturn	59;39		1,8	— 8

Two manuscripts (IO 2083b and RAS Tod 36d) contain a recension which begins with dhruvāṅka 3; the positions there indicate the date 13 March 1553, which is 4016 × 3 days from 18 March 1520.

	dhruvāñka 3		true tropical longitudes	differences
Sun	5,44;13,21°		3°	—19°
Moon	5,38;47,27		5,52	—13
Lunar apogee	1, 9;18			
Lunar node	—4,10;50		—3;54	—17
Mars	2,20;32		2,4	+17
Mercury's anom.	4,19;12	(Mercury)	5,35	
Jupiter	2,13;22		2,26	—13
Venus' anom.	1,38; 3	(Venus)	39	
Saturn	5,28;15		5,39	—11

It appears from the colophon of RAS Tod 36d on f. 14v that this recension was made by Rūpavijaya gaṇī, the vācaka; for it reads: iti grahalāghavasāraṇī saṃpūrṇaḥ // gaṇirūpavijayavācakakṛte. Rūpavijaya gaṇi is mentioned again in RAS Tod 45 as the teacher's teacher of the scribe Bhojavijaya, who copied that manuscript in 1732. The invocation on f. 1v of RAS Tod 64d is: śrījayavijaya-gaṇicaraṇakamalebhyo namaḥ; Jayavijaya gaṇi is probably Rūpa-vijaya's teacher.

A third recension (RAS Tod 36a) begins with dhruvāṅka 11 beginning on 27 February 1641, which is 4016 × 11 days from 18 March 1520.

	dhruvāṅka 11		true tropical longitudes	differences
Sun	5,29;39,59°		5,49°	—19°
Moon	5, 7;37,59		5,25	—17
Lunar apoges	47;18			
Lunar node	—2,33;32		—2,15	—18
Mars	56;16		50	+ 6
Mercury's anom.	5,51;36	(Mercury)	5,38	
Jupiter	4,42;58		5,3	—20
Venus' anom.	1,45;47	(Venus)	30	
Saturn	5,22;39		5,35	—12

A fourth version, described under *Grahalāghavasāriṇī* I A, is found in RAS Tod 57.

II. Manuscripts

*RAS Tod 57. 15ff. Copied in Saṃ. 1777 = A.D. 1720.
*IO 2083b. Ff. 1–2 and 4–8.
*Oxford CS d. 774g. Ff. 1–8, 10–14, 9, and 2bis.
*RAS Tod 36a. 12ff.
*RAS Tod 36d. 14ff.

III. Tables

The tables of planetary mean motions are for 1 to 9, 10 to 90, 100 to 900, and 1000 to 4000 days, and for 1 to 30 dhruvāṅkas of 4016 days each.

The mean daily motions (derived from the entries for 60 days) are:

Saturn	0; 2, 0,23, 4°	Mercury's anomaly	3; 6,24, 8, 7°
Jupiter	0; 4,59, 8,34	Moon	13;10,34,51,55
Mars	0;31,26,31, 3	Lunar apogee	0; 6,40,51,25
Sun	0;59, 8,10,16	Lunar node	—0; 3,10,48,24
Venus' anomaly	0;36,59,40, 7		

1. Table of the mean motion of the Sun. The motion for 400 days is 11^s 12;24,45,41°, which implies a mean daily motion of 0;59,8,10,16, . . . °.

Manuscripts: IO 2083b. f. 1r; Oxford CS d. 774g. f. 1v; RAS Tod 36a. f. 1v; RAS Tod 36d. f. 1v.

2. Table of the mean motion of the Moon. The motion for 400 days is 4^s 25;24,22,10°, which implies a mean daily motion of 13;10,34,51,55, . . . °.

Manuscripts: IO 2083b. f. 1r; Oxford CS d. 774g. f. 2r and f. 2bis r; RAS Tod 36a. ff. 1v–2r; RAS Tod 36d. ff. 1v–2r.

3. Table of the mean motion of the lunar apogee. The motion for 4000 days is 2^s 25;23,48,34°, which implies a mean daily motion of 0;6,40,51,8, . . . °.

Manuscripts: IO 2083b. ff. 1r–1v; Oxford CS d. 774g. f. 2v and f. 2bis v; RAS Tod 36a. f. 2r; RAS Tod 36d f. 2r.

4. Table of the mean motion of the lunar node. The motion for 4000 days is -7^s 2;0,28,4°, which implies a mean daily motion of -0;3,10,48,25, . . . °.

Manuscripts: IO 2083b. f. 1v; Oxford CS d. 774g. f. 3r; RAS Tod 36a. ff. 2r–2v; RAS Tod 36d. ff. 2r–2v.

5. Table of the mean motion of Mars. The motion for 4000 days is 9^s 26;7,50,39°, which implies a mean daily motion of 0;31,26, 31,3, . . . °.

Manuscripts: IO 2083b. ff. 1v–2r; Oxford CS d. 774g. f. 3v; RAS Tod 36a. f. 2v; RAS Tod 36d. ff. 2v–3r.

6. Table of the mean motion of Mercury's anomaly. The motion for 4000 days is 6^s 6;49,1,21°, which implies a mean daily motion of 3;6,24,8,7, . . . °.

Manuscripts: IO 2083b. f. 2r; Oxford CS d. 774g. f. 4r; RAS Tod 36a. ff. 2v–3r; RAS Tod 36d. f. 3r.

7. Table of the mean motion of Jupiter. The motion for 4000 days is 11^s 2;22,51,26°, which implies a mean daily motion of 0;4,59,8,34, . . . °.
Manuscripts: IO 2083b. f. 2r; Oxford CS d. 774g. f. 4v; RAS Tod 36a. f. 3r; RAS Tod 36d. ff. 3r–3v.

8. Table of the mean motion of Venus' anomaly. The motion for 4000 days is 10^s 6;17,54,2°, which implies a mean daily motion of 0;36,59,40,6, . . . °.
Manuscripts: IO 2083b. ff. 2r–2v; Oxford CS d. 774g. f. 5r; RAS Tod 36a. ff. 3r–3v; RAS Tod 36d. f. 3v.

9. Table of the mean motion of Saturn. The motion for 4000 days is 4^s 13;45,38,27°, which implies a mean daily motion of 0;2,0,23,4, . . . °.
Manuscripts: IO 2083b. f. 2v; Oxford CS d. 774g. f. 5v; RAS Tod 36a. f. 3v.

B. Tables of planetary equations.

Each of these tables has 3 columns. The first contains the argument: 1° to 90° for the equation of the center, 1° to 180° for the equation of the conjunction. The second gives the equation in degrees, minutes, and seconds. And the third indicates the increment to (or decrease from) the mean daily motion in degrees and minutes. The tables for the equations of the center also give the longitudes of the planets' apogees.

10. Table of the equation of the center of the Sun. The apogee is at 78° (Oxford CS d. 774g also gives it as Gemini 17;16, 51°); the maximum equation is 2;10,45°.
Manuscripts: IO 2083b. f. 2v; Oxford CS d. 774g. ff. 7r–7v; RAS Tod 36a. f. 4r; RAS Tod 36d. f. 5r–5v; RAS Tod 57 f. 6r.

11. Table of the equation of the center of the Moon. The maximum equation is 5;1,40°.
Manuscripts: Oxford CS d. 774g. ff. 7v–8r; RAS Tod 36a. f. 4v; RAS Tod 36d. ff. 5v–6r; RAS Tod 57 f. 6v.

12. Table of the equation of the center of Mars. The apogee is at 120°, the maximum equation is 13;0°.
Manuscripts: Oxford CS d. 774g. f. 9v; RAS Tod 36a. f. 5r; RAS Tod 36d. ff. 6r–6v; RAS Tod 57 f. 7r.

13. Table of the equation of the center of Mercury. The apogee is at 210°, the maximum equation is 3;36°.
Manuscripts: IO 2083b. f. 4r; Oxford CS d. 774g. f. 10v; RAS Tod 36a. f. 6v; RAS Tod 36d. ff. 6v–7r; RAS Tod 57 f. 7v.

14. Table of the equation of the center of Jupiter. The apogee is at 180°, the maximum equation 5;42°.
Manuscripts: IO 2083b. ff. 4r–4v; Oxford CS d. 774g. ff. 11v–12r; RAS Tod 36a. f. 8r; RAS Tod 36d. ff. 7v–8r; RAS Tod 57 f. 8r.

15. Table of the equation of the center of Venus. The apogee is at 60° (read 90°), the maximum equation 1;30°.
Manuscripts: IO 2083b. f. 4v; Oxford CS d. 774g. ff. 13r–13v; RAS Tod 36a. f. 9v; RAS Tod 36d. ff. 8r–8v; RAS Tod 57 f. 8v.

16. Table of the equation of the center of Saturn. The apogee is at 240°, the maximum equation 9;18°.
Manuscripts: IO 2083b. ff. 4v–5r; Oxford CS d. 774g. f. 14v; RAS Tod 36a. f. 11r; RAS Tod 36d. ff. 8v–9r; RAS Tod 57 f. 9r.

17. Table of the equation of the conjunction of Mars. The maximum equation is 40° at an argument of 135°.
Manuscripts: IO 2083b. ff. 5r–6r; Oxford CS d. 774g. ff. 8v–9r; RAS Tod 36a. ff. 5v–6r; RAS Tod 36d. ff. 9r–10r; RAS Tod 57 ff. 9v–10r.

18. Table of the equation of the conjunction of Mercury. The maximum equation is 21;12° at an argument of 105° to 120°.
Manuscripts: IO 2083b. ff. 6r–6v; Oxford CS d. 774g. ff. 9v–10v; RAS Tod 36a. ff. 7r–7v; RAS Tod 36d. ff. 10r–11r; RAS Tod 57 ff. 10v–11r.

19. Table of the equation of the conjunction of Jupiter. The maximum equation is 10;48° at an argument of 105°.
Manuscripts: IO 2083b. ff. 6v–7r; Oxford CS d. 774g. ff. 11r–11v; RAS Tod 36a. ff. 8v–9r; RAS Tod 36d. ff. 11r–12r; RAS Tod.57 ff. 11v–12r.

20. Table of the equation of the conjunction of Venus. The maximum equation is 46;6° at an argument of 135°.
Manuscripts: IO 2083b. ff. 7r–7v; Oxford CS d. 774g. ff. 12r–13r; RAS Tod 36a. ff. 10r–10v; RAS Tod 36d. ff. 12r–13v; RAS Tod 57 ff. 12v–13r.

21. Table of the equation of the conjunction of Saturn. The maximum equation is 5;42° at an argument of 90° to 105°.
Manuscripts: IO 2083b. ff. 7v–8r; Oxford CS d. 774g. ff. 13v–14r; RAS Tod 36a. ff. 11v–12r; RAS Tod 36d. ff. 13v–14v; RAS Tod 57 ff. 13v–14r.

The *Grahalāghavasāriṇī* I A.

I. The *Grahalāghavasāriṇī* I A.

In this work, though the tables of the planetary equations are identical with those of the *Grahalāghavasāriṇī* I and the mean motions are like those of that text derived from the *Grahalāghava* of Gaṇeśa, the arrangement of the mean motion tables differs. The kṣepakas, given in column 0 of the final segments of the mean motion tables, are identical with those of the Anonymous of 1520; the epoch then is 18 March 1520.

II. Manuscripts.

*RAS Tod 57. 15ff. Copied in Saṃ. 1777 = A.D. 1720.
*Oxford CS g. 17. F. 118r.
*RAS Tod 36d. 14ff.

III. Tables.

1. Table of the mean motion of the Sun for 1 to 30 days, for 1 to 11 "months" of 30 days each, for 1 to 11 "years" of 360 days each, and for 0 to 30 periods of 4016 days each; all of the mean motion tables are arranged in this way. The daily mean motion of the Sun is 0;59,8,10,17°.
Manuscripts: RAS Tod 57 f. 1v.

2. Table of the mean motion of the Moon; the mean daily motion is 13;10,34,51,55, . . . °.
Manuscripts: Oxf. CS g. 17 f. 118r; RAS Tod 57 f. 2r.

3. Table of the mean motion of the lunar apogee; the mean daily motion is 0;6,40,51,25, . . . °.
Manuscripts: RAS Tod 57 f. 2v.

4. Table of the mean motion of the lunar node; the mean daily motion is –0;3,10,48,35, . . . °.
Manuscripts: RAS Tod 57 f. 3r.

5. Table of the mean motion of Mars; the mean daily motion is 0;31,26,31,3, . . . °.
Manuscripts: RAS Tod 57 f. 3v.

6. Table of the mean motion of Mercury's anomaly; the mean daily motion is 3;6,24,8,7, . . . °.
Manuscripts: RAS Tod 57 f. 4r.

7. Table of the mean motion of Jupiter; the mean daily motion is 0;4,59,8,34, . . . °.
Manuscripts: RAS Tod 57 f. 4v.

8. Table of the mean motion of Venus' anomaly; the mean daily motion is 0;36,59,40,8, . . . °.
Manuscripts: RAS Tod 57 f. 5r.

9. Table of the mean motion of Saturn; the mean daily motion is 0;2,0,23,4, . . . °.
Manuscripts: RAS Tod 57 f. 5v.

10 to 21 equal tables 10 to 21 of *Grahalāghavasāriṇī* I.
Manuscripts: RAS Tod 57 ff. 6r–14r.

22. Table of the mean motion of the Sun for 1 to 9 days and for 10 to 60 days; tables 22 to 30 are set up in the same way. The mean daily motion is 0;59,8,10°.
Manuscripts: RAS Tod 36d. f. 4r; RAS Tod 57 f. 14v.

23. Table of the mean motion of the Moon for 1 to 9 days and for 10 to 60 days. The mean daily motion is 13;10,35,52°.
Manuscripts: RAS Tod 36d. f. 4r; RAS Tod 57 f. 14v.

24. Table of the mean motion of the lunar apogee for 1 to 9 days and for 10 to 60 days. The mean daily motion is 0;6,40,51°.
Manuscripts: RAS Tod 36d. f. 4r; RAS Tod 57 f. 14v.

25. Table of the mean motion of Mars for 1 to 9 days and for 10 to 60 days. The mean daily motion is 0;31,26,31°.
Manuscripts: RAS Tod 36d. ff. 4r–4v; RAS Tod 57 f. 14v.

26. Table of the mean motion of Mercury's anomaly for 1 to 9 days and for 10 to 60 days. The mean daily motion is 3;6,24,0°.
Manuscripts: RAS Tod 36d. f. 4v; RAS Tod 57 ff. 14v–15r.

27. Table of the mean motion of Jupiter for 1 to 9 days and for 10 to 60 days. The mean daily motion is 0;4,59,8°.
Manuscripts: RAS Tod 36d. f. 4v; RAS Tod 57 f. 15r.

28. Table of the mean motion of Venus' anomaly for 1 to 9 days and for 10 to 60 days. The mean daily motion is 0;36,59,40°.
Manuscripts: RAS Tod 36d. f. 4v; RAS Tod 57 f. 15r.

29. Table of the mean motion of Saturn for 1 to 9 days and for 10 to 60 days. The mean daily motion is 0;2,0,23°.
Manuscripts: RAS Tod 36d. ff. 4v–5r; RAS Tod 57 f. 15r.

30. Table of the mean motion of the lunar node for 1 to 9 days and for 10 to 60 days. The mean daily motion is –0;3,10,48°.
Manuscripts: RAS Tod 57 f. 15r.

31. Table entitled pratyabdam bījā ("yearly bījas"):

bu u (Mercury's apogee?)	8ˢ28,32,41,59
śu u (Venus' apogee?)	0,28,38,46, 9
u (apogee?)	0,11,12,54,52
śu (epact)	11; 3,53,22,40 tithis
abda (Lord of the Year)	1;15,31,31,24 days

Manuscripts: RAS Tod 36d. f. 5r; RAS Tod 57 f. 15r.

32. Table of yearly mean motions.

Sun	0; 0, 0, 0°	Mercury's anomaly	54;45,22,48°
Moon	2,12;46,41, 0	Jupiter	30;21, 3,36
Lunar anomaly	1,32; 5,40,47	Venus' anomaly	3,45;11,44,25
Lunar node	–19;21,12,12	Saturn	12;12,53,36
Mars	3,11;24, 9, 0		

Manuscripts: RAS Tod 36d. f. 5r; RAS Tod 57 f. 15r.

33. Table of mean motions in 7 days.

Sun	6;53,52,12°	Mars	3;40, 5,37°
Lunar apogee	0;46,46, 0	Mercury's anomaly	21;44,48,57
Moon	1,32;14, 7,11	Jupiter	0;34,54, 0
——	46;48, 0 ,0	Venus' anomaly	4;18,57,40
Lunar node	-0;22,15,36	Saturn	0;14, 2,21

Manuscripts: RAS Tod 36d. f. 5r; RAS Tod 57 f. 15r.

The *Tiṭhicintāmaṇi* of Gaṇeśa

For this work, written in Śaka 1447 = A.D. 1525, see *SATIUS* pp. 47b–50b. The manuscripts of it described in this catalogue are:

*IO 2000. 28ff. Copied in Śaka 1705 = A.D. 1783.
*IO 1990b. 3ff. Copied in Śaka 1718 = A.D. 1796.
*BM Add. 14,365f. A 4ff. and B 8ff.

Bṛhattithicintāmaṇi of Gaṇeśa.

For this work, composed in Śaka 1474 = A.D. 1552, see *SATIUS*, pp. 50b–51a. The manuscripts of it described in this catalogue are:

*BM Add. 14,363f. 1f.
*BM Add. 14,365 m. Pp. 1–6.
*BM Add. 26,448c. Ff. 9–10, 89–90, 123–132, 135–136, and 138–146. See also the commentary by Viṣṇu: BM Add. 14,365n. Pp. 1–15.

Candrārkī of Dinakara.

For this work, written in Śaka 1500 = A.D. 1578, see *SATIUS*, pp. 51b–53a. The manuscripts of it described in this catalogue are:

*Oxford Walker 208b. 7ff.
*RAS Tod 24f. 3r.

See also Dinakara's own ṭippaṇa: 10 2541e. 2ff.

The *Kheṭasiddhi* of Dinakara.

I. The Life of Dinakara.

See *SATIUS*, p. 51b, and the manuscripts of the *Candrārkī* described above (IO 2541e and Oxford Walker 208b). Vss. 35–36 of his *Kheṭasiddhi* are as follows:

śrīmadgotre kauśike sāgniko'bhū<d>
    dumḍākhyo'yam jñātimoḍhe prasūtaḥ /
khyāto grāme brahmamatyāḥ samīpe
    bārejyākhye vipravarjyair vikīrṇe //35//

tatpautrajo dinakaraḥ sakalāni kheṭa-
    karmāṇi vīksya satataṃ hi savāsanāni /
cakre śake khakhatithipramite ca saṃvat
    paṃcāgnibhūpatimite laghukheṭa<si>ddhiḥ (read ddhiṃ)
        //36//

These verses confirm that Dinakara was the great-grandson of the sāgnika (maintainer of a sacred fire) Dunda of the Moḍha family and the Kauśika gotra, who lived at Bārejya near the Brahmamatī.

Dinakara states that he wrote the *Kheṭasiddhi* in Śaka 1500, Saṃ. 1635 = A.D. 1578; the date Monday 31 March 1578 is indicated by the kṣepakas in table 4.

	kṣepakas	mean sidereal longitudes		true tropical longitudes	differ- ences
Epact	22;19,34,10, 0 tithis				
Lord of the year	1;24.57,12,30 days				
Moon	22;19,33,53,50 (× 12°)	4,27;54,46,46, 0°		5, 6°	—38°
Lunar apogee	0;27,17,18,15	5;27,44,57, 0			
Mars	20;58,59,52,45	4,11;47,58,33, 0		5, 3	—51
Mercury's anomaly	19;47, 2,40,23	3,56;24,32, 4,36	(Mercury)	5,54	
Jupiter	14;37,52,14,15	2,55;34,27, 5, 0		3, 7	—11
Venus' anomaly	28;27,17,56,30	5,41;27,35,18, 0	(Venus)	9	
Saturn	22;37, 2,13, 0	4,29;24,26,36, 0		4,54	—25 '
Lunar node	—1;20,16,27,49	—16; 3,17,33,48		2	—18

For a discussion of these kṣepas, see below p. 104.

That Dinakara came from Gujarāt is confirmed by the fact that table 5 is entitled: rāmabīja // gurjarapradeśa; see also table 42 where both gurjura and saurāṣṭra are mentioned.

II. Manuscripts:

*IO 2648. 91ff. Copied in Saṃ. 1693, Śaka 1559 = A.D. 1637.
Goṇḍal 35. 8ff. Copied in Saṃ. 1793 = A.D. 1736.

BORI 303 of 1882/83. 6ff. Copied in Saṃ. 1796 = A.D. 1739.

Oudh IV (1874) VIII 1. 12pp. Copied in A.D. 1856. Property of Śivanātha of Unao Zila.

Anup 4503. 83ff. Probably identical with PL, Bühler IV E 45. 84ff. Property of Jayakṛṣṇa of Sudāmāpurī. Bühler notes the existence of another copy.

Baroda 1081. 5ff.

Jaipur. 3ff.

RORI 4731. 30ff.

III. Tables

An examination of these tables will reveal that they are not all derived from one work. Tables 1 to 3, 15 to 20, and 47 to 49 are probably not from the *Kheṭasiddhi*.

1. Table of the beginnings of the nakṣatracaraṇas.
Manuscripts: IO 2648 B f. 1r.

2. Table of the (approximate) quotients of 800′ (= 13;20°, a nakṣatra) divided by various numbers:

1	800	8	100	18	44	28	29	52	15
1½	550	9	90	19	42	34	24	55	14
2	400	10	80	20	40	37	22	56	14
2½	320	11	72	21	38	39	20	58	13½
3	270	12	67	22	36	41	19	60	13
3½	240	13	61	23	35	43	18½	64	12½
4	200	14	57	24	33	45	18	66	12
5	160	15	53	25	32	46	17	69	11½
6	133	16	50	26	31	48	17	72	11
7	114	17	47	27	30	49	16	73	10½

Manuscripts: IO 2648 B f. 1v.

3. Table of the week-days on which the Sun enters each of the 27 nakṣatras (the manuscript reads 1–18, 18–26). The entries are given, for 1 to 18 and 26 (= 27), as negative quantities; the numbers in parentheses are the differences between 7 and those negative quantities.

Aśvinī	−2;10,30	+(4;49,30)	Svāti	4;31,51	(2;28, 9)
Bharaṇī	2;29,45	(4;30,15)	Viśākhā	5;14, 0	(1;46, 0)
Kṛttikā	2;42,10	(4;17,50)	Anurādhā	6; 1,40	(0;58,20)
Rohiṇī	2;48,32	(4;11,28)	Jyeṣṭhā	−6;54, 0	(0; 6, 0)
Mṛgaśiras	2;49,50	(4;10,10)	Mūla	+6;10,10	
Ārdrā	2;47,50	(4;12,10)	Pūrvāṣāḍhā	5;12,37	
Punarvasu	2;44,10	(4;15,50)	Uttarāṣāḍhā	4;14,55	
Puṣya	2;40,57	(4;19, 3)	Śravaṇa	3;17,46	
Āśleṣā	2;39,53	(4;20, 7)	Dhaniṣṭhā	2;23, 0	
Maghā	2;42,46	(4;17,14)	Śatabhiṣak	1;31,50	
Pūrvaphālgunī	2;51, 2	(4; 8,58)	Pūrvabhādra-		
Uttaraphālgunī	3; 5,47	(3;54,13)	padā	0;45, 9	
Hasta	3;27,28	(3;32,32)	Uttarabhādra-		
Citra	3;56,10	(3; 3,50)	padā	+0; 5,21	
			Revati	−0;28,18	(+6;31,42)

Cf. table 42.

Manuscripts: IO 2648 B f. 1v.

4. Table of mean yearly motions (guṇakas) and of kṣepakas for Śaka 1500, in terms of tables 50 to 54 for the planets. The guṇakas are:

Epact	11; 3,53,22,40 tithis	
Lord of the year	1;15,31,17,17 days	
Moon	11; 3,53,22,40 (× 12°)	2,12;46,40,32, 0°
Lunar apogee	3;23,22,36,10	40;40,31,14, 0
(Lunar anomaly		1,32; 6, 9,18, 0)
Mars	15;57, 0,46,40	3,11;24, 9,20, 0
Mercury's anom.	4;33,46,35,11	54;45,19, 2,12
Jupiter	2;31,45,32,33	30;21, 6,30,36
Venus' anom.	18;45,59,29, 3	3,45;11,53,48,36
Saturn	1; 1, 4,17, 6	12;12,51,25,12
Lunar node	—1;36,47,49,59	—19;21,33,59,48

These parameters are identical with those of the Brāhmapakṣa except that the guṇakas for Mars, Jupiter, and the lunar node must be increased by 0;0,0,0,6°, that for the lunar apogee for 0;0,0,30°.

The kṣepakas are equivalent to those computed by the *Mahādevī* for Śaka 1500 and found in the Anonymous of 1578 (*SATIUS*, pp. 53a–53b) and table 5 of the *Candrārkī* as well as in tables 6 to 14 of the *Kheṭasiddhi* diminished by the rāmabīja in table 5. For Saturn the Anonymous of 1578 agrees with the *Mahādevī* in giving 22;34,2,13,0 whereas the *Kheṭasiddhi* in table 14 has 22;34, 32,13,0, a value also used in table 4; for 22;34,32,13,0 diminished by the rāmabīja 0;7,30 give Dinakara's 22;27,2,13,0. It is clear, then, that the Anonymous of 1578 gives mean motion tables for the true longitude tables 50 to 54 of the *Kheṭasiddhi*.

	table 4	tables 6 to 14	*Candrārkī* or Anonymous of 1578	rāmabīja
Epact	22;19,34,10, 0	22;18,19,10, 0	22;18,19,10, 0	—0; 1,15
Lord of the year	1;24,57,12,30	1;22,27,12,30	1;24,57,12,30	—0; 2,30
Moon	22;19,33,53,50		22;18,19,10, 0	—0; 1,15
Lunar apogee	0;27,17,18;15	0;29,47,18,15	(0;29,47,14,20)	+0; 2,30
Mars	20;58,59,52,45	21; 5,39,52,45	21; 5,39,52,45	+0; 6,40
Mercury's anom	19;47, 2,40,23	20;45,22,40,23	20;45,22,40,23	+0;58,20

Jupiter	14;37,52,14,15	14;22, 2,14,15	14;22, 2,14,15	—0;15,50
Venus' anom.	28;27,17,56,30	28; 4,47,56,03	28; 4,47,56,30	—0;22,30
Saturn	22;27, 2,13, 0	22;34,32,13, 0	22;34, 2,13, 0	+0; 7,30
Lunar node	1;20,16,27,49	1;17,46,27,49	1;17,46,27,49	—0; 2,30

Manuscripts: IO 2648 C f. 1r.

5. Table of rāmabījas in ghaṭis for gurjarapradeśa.

Epact	—1;15	Mercury's anomaly	+58;20
Lord of the year	—2;30	Jupiter	—15;50
Moon	—1;15	Venus' anomaly	—22;30
Lunar apogee	+2;30	Saturn	+ 7;30
Mars	+6;40	Lunar node	—2;30

Manuscripts: IO 2648 C f. 1r.

6. Table of the mean motion of the Epact for 1 to 9, 10 to 90, and 100 to 1000 years with a kṣepa; tables 7 to 14 are set up in the same way. The yearly parameter is 11;3,53,22,40 tithis; the kṣepa is 22;18,19,10,0 tithis.
Manuscripts: IO 2648 C f. 1v.

7. Table of the mean motion of the Lord of the year. The yearly parameter is 1;15,31,17,17 days; the kṣepa is 1;22,27,12,30.
Manuscripts: IO 2648 C f. 1v.

8. Table of the mean motion of the lunar apogee. The yearly parameter is 3;23,22,36,10 = 40;30,31,14,0°; the kṣepa is 0;29,47, 18,15 = 5;57,27,39,0°.
Manuscripts: IO 2648 C f. 2r.

9. Table of the mean motion of the lunar node. The yearly parameter is -1;36,47,49,59 = -19;21,33,59,48°; the kṣepa is 1;17,46, 27,49 = 15;33,17,33,48°.
Manuscripts: IO 2648 C f. 2r.

10. Table of the mean motion of Mars. The yearly parameter is 15;57,0,46,40 = 3,11;24,9,20,0°; the kṣepa 21;5,39,52;45 = 4,13;7, 58,33,0°.
Manuscripts: IO 2648. C f. 2v.

11. Table of the mean motion of Mercury's anomaly. The yearly parameter is 4;33,46,35,11 = 54;45,19,2,12°; the kṣepa is 20;45,22,40,23 = 4,9;4,32,4,36°.
Manuscripts: IO 2648 C f. 2v.

12. Table of the mean motion of Jupiter. The yearly parameter is 2;31,45,32,33° = 30;21,6,30,36°; the kṣepa is 14;22,2,14,15° = 2,52;24,26,51,0°.
Manuscripts: IO 2648 C f. 3r.

13. Table of the mean motion of Venus' anomaly. The yearly parameter is 18;45,59,29,3° = 3,45;11,53,48,36°; the kṣepa is 28;4,47,56,30° = 5,36;57,35,18,0°.
Manuscripts: IO 2648 C f. 3r.

14. Table of the mean motion of Saturn. The yearly parameter is 1;1,4,17,6° = 12;12,51,25,12°; the kṣepa is 22;34,32,13,0° = 4,30;54,26,36,0°.
Manuscripts: IO 2648 C f. 3v.

15. Table of the mean motion of the Moon for 1 to 14 days; the mean daily motion is 13;10,35°. Cf. table 30 of the *Kheṭasiddhi*.
Manuscripts: IO 2648 C f. 3v.

16. Table of the mean motion of the lunar anomaly for 1 to 14 days; the mean daily motion is 13;3,54°. This is table 38 of the *Kheṭasiddhi*.
Manuscripts: IO 2648 C f. 3v.

17. Table of the mean motion of the Moon for 1 to 27 avadhis; the motion in 26 avadhis (= 364 days) is 1,56;12,42°. Cf. table 43 of the *Kheṭasiddhi*.
Manuscripts: IO 2648 C f. 4r.

18. Table of the mean motion of the lunar anomaly for 1 to 27 avadhis; the motion in 26 avadhis is 1,15;39,30°.
Manuscripts: IO 2648 C f. 4r.

19. Table of the mean motion of the lunar apogee for 1 to 27 avadhis; the motion in 26 avadhis is 40;32,44° (one should have, from tables 17 and 18, 40;33,12°). Cf. table 44 of the *Kheṭasiddhi*.
Manuscripts: IO 2648 C f. 4v.

20. Table of the mean motion of the lunar node for 1 to 27 avadhis; the motion in 26 avadhis as -19;17,34°.
Manuscripts: IO 2648 C f. 4v.

21. Table of the mean motion of the lunar node for 1 to 27 avadhis; the motion in 26 avadhis is 5,40;42,26°.
Manuscripts: IO 2648 C f. 5r.

22. Table of the mean motion of Mars for 1 to 27 avadhis; the motion in 26 avadhis is 3,10;44,35°.
Manuscripts: IO 2648 C f. 5r.

23. Table of the mean motion of Mercury's anomaly for 1 to 27 avadhis; the motion in 26 avadhis is 49,36,15°.
Manuscripts: IO 2648 C f. 5v.

24. Table of the mean motion of Jupiter for 1 to 27 avadhis; the motion in 26 avadhis is 30;14,50°.
Manuscripts: IO 2648 C f. 5v.

25. Table of the mean motion of Venus' anomaly for 1 to 27 avadhis; the motion in 26 avadhis is 3,43;10,55°
Manuscripts IO 2648 C f. 6r.

26. Table of the mean motion of Saturn for 1 to 27 avadhis; the motion in 26 avadhis is 12;10,20°.
Manuscripts: IO 2648 C f. 6r.

27. Table of the mean motion of the Sun for 1 to 27 avadhis; the motion in 26 avadhis is 5,58;45,30.
Manuscripts: IO 2648 C f. 6v.

28. Table of the catuṣṭayaikya, which is a combination of the caraphala (half equation of daylight), deśāntara (longitudinal difference), and dvisamskrti (equation of time) for 1 to 27 avadhis; cf. table 6 of the *Grahakaumudī* of Nṛsimha and Poleman 4946 [?] (*SATIUS*, pp. 31a–31b), as well as table 16 of the *Jagadbhūṣana*. Cf. also table 44 of the *Kheṭasiddhi*. The deśāntara is apparently about 20.

1	−0;5	10	0;21	19	2;2
2	+0;27	11	0;12	20	2;21
3	0;48	12	+0;2	21	2;29
4	1;8	13	−0;8	22	2;25
5	1;13	14	0;21	23	2;8
6	1;14	15	0;38	24	1;44
7	1;2	16	0;56	25	1;16
8	0;52	17	1;22	26	0;43
9	0;37	18	1;45	27	−0;8

Manuscripts: IO 2648 C f. 6v.

29. Table of the mean motion of the Sun, Mercury, and Venus for 1 to 14 days, the mean daily motion is 0;59,8°C.
Manuscripts: IO 2648 C f. 7r.

30. Table of the mean motion of the Moon for 1 to 14 days; the mean daily motion is 13;10,34,25,....°. Cf. table of the *Kheṭasiddhi.*
Manuscripts: IO 2648 C f. 7r.

31. Table of the mean motion of the lunar apogee for 1 to 14 days; the mean daily motion is 0;6.40,55,42,....°.
Manuscripts: IO 2648 C f. 7r.

32. Table of the mean motion of the lunar node for 1 to 14 days; the mean daily motion is 0;3,11,41,32, ...°.
Manuscripts: IO 2648 C f. 7r.

33. Table of the mean motion of Mars for 1 to 14 days; the mean daily motion is 0;31,26,30.
Manuscripts: IO 2648 C f. 7v.

34. Table of the mean motion of Mercury's conjunction for 1 to 14 days; the mean daily motion is 4;5,32,17,8,...°.
Manuscripts: IO 2648 C f. 7v.

35. Table of the mean motion of Jupiter for 1 to 14 days; the mean daily motion is 0;4.59,8,34,...°.
Manuscripts: IO 2648 C f. 7v.

36. Table of the mean motion of Venus' conjunction for 1 to 14 days; the mean daily motion is 1;36,7,47,8,...°.
Manuscripts: IO 2648 C f. 7v.

37. Table of the mean motion of Saturn for 1 to 14 days; the mean daily motion is 0;2.0,34,17,...°.
Manuscripts: IO 2648 C f. 8r.

38. Table of the mean motion of the lunar anomaly for 1 to 14 days; the mean daily motion is 13;3,54°. This is table 16 of the *Kheṭasiddhi.*
Manuscripts: IO 2648 C f. 8r.

39. Table of the true longitudes and daily progresses of the Sun for 1 to 27 avadhis. The epoch longitude is 2;6,34° (i.e., when the mean longitude is 0°); the maximum daily progress is 1;1,28°

at avadhi 20, the minimum 0;56,59° at avadhi 7. The is not computed with the same parameters as was table 1 of the *Candrārkī*.
Manuscripts: IO 2648 C f. 8r.

40. Table of the ends of the 27 nakṣatras.
Manuscripts: IO 2648 C f. 8v.

41. Table of the beginnings of the 27 nakṣatras.
Manuscripts: IO 2648 C f. 8v.

42. Table of the week-days on which the Sun enters 1 to 27 nakṣatras, in 8 columns. Column 1 lists the nakṣatras; column 2 gives the week–days (these differ from table 3 and, to a small extent, from table 47); column 3 gives the Sun's daily progress in minutes; column 4 lists the length of daylight for gurjara, Gujarāt) in ghaṭikās; column 5 gives cālakas in palas to column 4; column 6 lists the half equations of daylight in palas; column 7 gives half lengths of daylight for saurāṣṭra (Saurāṣṭra) in ghaṭikās, and column 88 lists the cālakas for column 7 in palas.

The sum of columns 6 and 7 always equals 15;0. In the following copy my suggested corrections are enclosed within parentheses beneath the relevant entries.

1	2	3	4	5	6	7	8
a	4;49,30	58;28	30;48	+3	−30	15;30	+1 ½
			(31;18)				
bha	4;30,31	57;58	31;48	2 ½	52	15;52	1 ¼
kr	4;18,38	57;23	31;41	2 ½	69	16;9	1 ¼
		(57;38)	(32;14)				
ro	4;12,36	57;20	32;36	1 ½	87	16;27	½
mr	4;11,24	57;3	32;5		(81)	(16;21)	
			(32;55)	+1	93	16;33	+1
ā	4;13,24	56;40	33;10				(+ ½)
		(56;50)		0	105	16;45	0
pu	4;16,43	56;56	33;10	−1	102	16;42	− ¾
pu	4;19,55	57;3	32;58	1 ½	94	16;34	1
a	4;20,44	57;14	32;36	3	82	16;22	1 ¼
ma	4;17,37	57;47	31;6	3	65	16;5	3
		(57;37)	(32;6)				(1 ½)
pū	4;9,19	58;10	31;38	3	47	15;47	1 ½
			(31;28)				
u	3;54,31	58;47	30;40	3	24	15;24	1 ½
			(30;50)		(25)	(15;25)	
ha	3;21,24	59;10	30;8	3	− 3	15;3	1 ½
		(59;17)					

ci	3;3,28	59;44	29;28 (29;26)	3	+19	14;41	1 ½
svā	2;27,22	60;9	28;44	2	42 (40)	14;18 (14;20)	1 ¼
vi	1;51,1 (1;45,1)	60;35 (60;34)	28;6	2	58	14;2	1 ½ (1)
a	0;56,57	60;58	27;32	−1 ¼	78	13;42	1
jye	0;4,15	61;6 (61;16)	27;6	0 (−1)	93	13;27	½
mū	6 8,23	61;11 (61;21)	26;50	+1 (0)	100	13;20	− ½
pū	5;10,33	61;22	26;51	2 (+1)	106	13;14	+ ½
u	4;12,32	61;19	27;2	2	100	13;20	½
śra	3;15,15	61;7	27;26	3	93	13;27	1 ¼
dha	2;20,32	61;1 (60;48)	28;2	3	75	13;45	1 ¼
śa	1;29,41	60;58 (60;26)	29;4 (28;40)	3	57	14;3	1 ½
pū	0;43,53	60;16 (60;0)	29;20	3	37	14;23	1 ½
u	0;4,4	59;44 (50;30)	30;34 (30;0)	<3> ½	15	14;45	½ (1 ½)
re	6;30,46 (6;30,56)	58;58	30;34 (30;44)	2 (3)	+ 8 (− 8)	14;52 (15;8)	3 (1 ½)

Manuscripts: IO 2648 C f. 9r.

43. Table of the mean motion of the Moon for 1 to 27 avadhis; the mean daily motion is 13;10,34,55,42,...°. Cf. table 17 of the *Khetasiddhi*.
Manuscripts: IO 2648 C f. 9v.

44. Table of the mean motion of the lunar apogee, catuṣṭayaikya (equation of time, half equation of daylight, and deśāntara combined), and Epact for 1 to 27 avadhis; the daily mean motion of the lunar apogee is 0;6,40,55,42,...°. Cf. table 19 of the *Khetasiddhi*. The entries for the catuṣṭayaikya are 0;1 or 0;2 higher in this table than in table 28 of the *Khetasiddhi*. The mean daily motion of the Epact—that is, the number of tithis in a day—is 1;0,57,11,52,...tithis.
Manuscripts: IO 2648 C f. 9v.

45. Table of the equation of the Moon for 0° to 90°; the maximum equation is 2;2,10° at 90°. Also given are the differences between the equations, and the increments to (or decreases from) the Moon's mean daily motion. This table differs from table 4 of

the *Candrarkī;* but its parameters are precisely identical with those of table 15 of the *Jagadbhuṣaṇa*.
Manuscripts: IO 2648 C ff. 10r-10v.

46. Table of the traikya (half equation of daylight and equation of time combined) for 0 to 365 days; cf. table 16 of the *Jagadbhūṣaṇa*. The maximum is + 1;45 on days 62 to 70, the minimum − 1;58 on days 280 to 281.
Manuscripts: IO 2648 C ff. 10v–12r.

47. Table of week-days on which the Sun enters the 27 nakṣatras; cf. table 42 of the *Kheṭasiddhi*.

Aśvinī	4;49,30	Svāti	2;27,31
Bharaṇī	4;30,42	Viśākhā	1;45,3
Kṛttikā	4;18,38	Anurādhā	0;56,59
Rohiṇī	4;12,36	Jyeṣṭhā	0;4,17
Mṛgaśiras	4;11,24	Mūla	6;8,25
Ārdrā	4;13,24	Pūrvāṣāḍhā	5;10,35
Punarvasu	4;16,53	Uttarāṣāḍhā	4;12,34
Puṣya	4;19,55	Śravaṇa	3;15,17
Āśleṣā	4;20,44	Dhaniṣṭhā	2;20,34
Maghā	4;17,35	Śatabhiṣak	1;29,43
Pūrvaphālgunī	4;9,10	Pūrvabhādrapadā	0;43,55
Uttaraphālgunī	3;54,15	Uttarabhādrapadā	0;4,6
Hasta	3;32,24	Revatī	6;31,0
Citra	3;3;30		

Manuscripts: IO 2648 C f. 12v.

48. Table of week-days on which the Sun enters the 12 zodiacal signs.

Aries	4;49,30	Libra	2;46,22
Taurus	0;46,35	Scorpio	4;39,32
Gemini	4;12,4	Sagittarius	6;8,25
Cancer	0;49,18	Capricorn	0;27,57
Leo	4;17,35	Aquarius	1;54,36
Virgo	0;19,30	Pisces	3;34,31

Manuscripts: IO 2648 C f. 12v.

49. Table of the multiplication of 1,45 by 1 to 36. Added by later hand to manuscript.
Manuscripts: IO 2648 C f. 12v.

50. Tables of the true longitudes of Mars for 1 to 27 avadhis; there are 30 tables which are precisely equal to the *Mahādevī* tables for which N equals O or an even number (*Kheṭasiddhi* N=1

is *Mahādevī* N=2; and *Kheṭasiddhi* N=30 is *Mahādevī* N=0); all *Mahādevī* functions are recorded. Tables 50 to 54 are all set up in this way; they are the true longitude tables to which not only tables 10 to 14 of the *Kheṭasiddhi* refer, but also the tables of the Anonymous of 1578.
Manuscripts: IO 2648 D ff. 1r–15v.

51. Tables of the true longitudes of Mercury.
Manuscripts: IO 2648 D ff. 16r–30v.

52. Tables of the true longitudes of Jupiter.
Manuscripts: IO 2648 D ff. 31r–45v.

53. Tables of the true longitudes of Venus.
Manuscripts: IO 2648 D ff. 46r–60v.

54. Tables of the true longitudes of Saturn.
Manuscripts: IO 2648 D ff. 61r–75v.

The *Tithisāraṇī* of Dinakara.

I. The *Tithisāraṇī*.

The author of the *Tithisāraṇī* is identical with the Dinakara who wrote the *Candrārkī* and the *Kheṭasiddhi* as is shown by the fact that verse 21 of the *Tithisāraṇī* equals verse 38 of the *Candrārkī* (in *SATIUS*, p. 51a):

bārejākhye vasan grāme cakre dinakaro mudā /
jātaḥ kuśikasagotre moḍhajñātisamudbhavaḥ //21//

The epoch of the *Tithisāraṇī* is given as Śaka 1505=A.D. 1583 in verse 2:

śāko bāṇābhraghastraiś ca hīno nighno guṇaiḥ svakaiḥ/
kṣepakair nijakair yukto dhruvaḥ syāc chuddhitaḥ sadā//21//

The kṣepas in verse 15 indicate that the exact date is Sunday 31 March 1583.

II. Manuscripts:

GVS 3157. 18ff. Copied in Saṃ. 1799=A.D. 1742 (*Dinakarasāraṇī*)

BORI 619. 31ff. Copied in Saṃ. 1875=A.D. 1818 (*Dinakarasāraṇī*)

Jaipur. 18ff. (*Dinakarīsāraṇī*)

*Poleman 4946 L. F. 1.

*RAS Tod 36b. 28ff.

III. Tables.

1. Table of tithis in 3 columns. Column 1 gives the argument as 0 to (372?) tithis, column 2 the tithikendra; and column 3 the week-day. The positions of columns 2 and 3 for tithi 0 are respectively 0;10,38 and 0;10,24.

Manuscripts: RAS Tod 36b. ff. 3r-7v.

2. Table of nakṣatras in 3 columns. Column 1 gives the argument as 0 to 373 nakṣatras; column 2 the nakṣatrakendra; and column 3 the week-day. F. 7v with the initial positions is not available to me.

Manuscripts: RAS Tod 36b. ff. 7v-12r.

3. Table of yogas in 3 columns. Column 1 gives the argument as 0 to 388 yogas; column 2 the yogakendras; and column 3 the week-day. The positions of columns 2 and 3 for yoga 0 are respectively 29;6,27 and 6;50,56.

Manuscripts: RAS Tod 36b. ff. 12r-16v.

4. Table of week-days on which the Sun enters each of the 27 nakṣatras. This is identical with the table in Poleman 4946 L (*SATIUS*, pp. 31a-31b).

Aśvinī	4;47,21	Puṣya	4;17,2
Bharaṇī	4;28,27	Āśleṣā	4;17,50
Kṛttikā	4;16,15	Maghā	4;14,44
Rohiṇī	4;10,5	Pūrvaphālgunī	4;6,15
Mṛgaśiras	4;8,41	Uttaraphālgunī	3;51,30
Ārdrā	4;10,36	Hasta	3;29,50
Punarvasu	4;14,0	Citra	3;0,51
Svāti	2;24,52	Śravaṇa	3;12,56
Viśākhā	1;42,29	Dhaniṣṭha	2;28,33
Anurādha	0;54,25	Śatabhiṣak	1;27,37
Jyeṣṭhā	0;1,47	Pūrvabhādrapadā	0;41,53
Mūla	6;5,56	Uttarabhādrapadā	0;2,19
Pūrvāṣāḍhā	5;8,8	Revatī	6;28,55
Uttarāṣāḍhā	4;10,3		

Manuscripts: RAS Tod 36b. f. 16v.

5. Table of week-days on which the Sun enters each of the 12 zodiacal signs. This also is found in Poleman 4946 L (*SATIUS*, p. 31b).

Aries	4;47,21	Leo	4;14,44	Sagittarius	6;5,56
Taurus	0;44,15	Virgo	0;16,50	Capricorn	0;25,38
Gemini	4;9.19	Libra	2;43,43	Aquarius	1;52,34
Cancer	0;46,27	Scorpio	4;36,54	Pisces	3;41,28

Manuscripts: RAS Tod 36b. f. 16v.

6. Table of corrections to the tithi for 0 to 27 days horizontal and for 0 to 59 ghaṭikās vertical; the hāras are given at the bottom of each page. The maximum correction is 24;47 at day 21, ghaṭikās 23 to 27 (negative) and at day 6, ghaṭikās 33 to 36 (positive).
Manuscripts: RAS Tod 36b. ff. 17r-20v.

7. Table of corrections to the nakṣatra for 0 to 27 days horizontal and for 0 to 59 ghaṭikās vertical; the hāras are given at the bottom of each page. The maximum correction is 22;56 at day 6, ghaṭikās 24 to 29 (positive) and at day 20, ghaṭikās 47 to 50 (negative).
Manuscripts: RAS Tod 36b. ff. 21r-24v.

8. Table of corrections to the yoga for 0 to 29 days horizontal and for 0 to 59 ghaṭikās vertical. The maximum correction is 21;20 at day 22, ghaṭikās 16 to 23 (negative) and 21;22 at day 6, ghaṭikās 57 to 58 (positive).
Manuscripts: RAS Tod 36b. ff. 25r-28v.

9. Table of yearly parameters in the *Dinakarasāraṇī*.

Epact	11;3,53 tithis	Tithibhoga	1;11,42
Lord of the Year	1;15,32 days	Nakṣatrabhoga	1;18,3
Manda	7;40,31	Yogabhoga	1;17,52
Tithidhruva	10;56,7	Tithikendra	7;5,49
Nakṣatradhruva	10;2,30	Nakṣatrakendra	7;0,30
Yogadhruva	10;2,30	Yogakendra	7;31,45

Manuscripts: RAS Tod 36b. f. 28v.

The *Rāmavinoda* of Rāmacandra.

I. The Life of Rāmacandra.

The first four verses of the *Rāmavinoda* inform us that it was written by Rāmacandra, the son of Ananta, for Rāma the bhūpāla using as epoch 35 years after the epoch of Jalāl al-Dīn Akbar, the Mogul Emperor who reigned from A.D. 1556 to 1605; Akbar's era is stated to be Saṃ 1612, Śaka 1477=A.D. 1555/6.

gaṇapatim abhivandya śrīśapādāravindaṃ
smaraṇaviditatattvo 'nantajo rāmacandraḥ /
akabaranṛpaśākād vakti pañcāṅgapatraṃ
sphuṭakhagasamavetaṃ rāmabhūpālatuṣṭyai // 1 //

sūryabhūpamitavikramaśāke labdhavān akhilabhūmipatitvam /
khyāpayan nijaśakaṃ khalu samrāḍ bhāty asāv akabaraḥ
kṣitipālaḥ // 2 //

bāṇarāmavidhuhīnite śake vikramasya kaliśālivāhanaḥ /
śailaśailamanubhir vivarjite 'sminn akabbaraśakād gatāḥ
samāḥ // 3 //

śāhakkabbararājyato gatasamāḥ pañcāgnihīnā guṇair
nighnāḥ kṣepayutās tithipramukhato vārādikendraṃ
bhavet /
ūrdhvāṅko'bhraguṇais tither nagayamair bhasyāśvanetrair yutā
vārośvaiḥ khaguṇais tathā tithibhayukkendrasya taṣṭas
tataḥ // 4 //

Rāmacandra's father, Ananta, the son of Cintāmaṇi who resided at Dharmapura on the Godāvarī in Vidarbha, wrote a ṭīkā on Mahādeva's *Kāmadhenu* among other works. This information is found in Rāma's *Muhūrtacintāmaṇi* (XIII 8-10), which he wrote at Girīśanagara (Benares) in Śaka 1522 = A.D. 1600:

āsīd dharmapure ṣaḍaṅganigamādhyetṛdvijair maṇḍite
jyotirvittilakaḥ phaṇīndraracite bhāṣye kṛtātiśramaḥ /
tattajjātakasaṃhitāgaṇitakṛn mānyo mahābhūbhujāṃ
tarkālaṅkṛtivedavākyavilasadbuddhiḥ sa cintāmaṇiḥ // 8 //

jyotirvidgaṇavanditāṅghrikamalas tatsūnur āsīt kṛtī
nāmnānanta iti prathām adhigato bhūmaṇḍalāhaskaraḥ /
yo ramyāṃ janipaddhatiṃ samakarod duṣṭāśayadhvaṃsinīṃ
ṭīkāṃ cottamakāmadhenugaṇite 'kārṣīt satāṃ prītaye //9//

tadātmaja udāradhīr vibudhanīlakaṇṭhānujyo
gaṇeśapadapaṅkajaṃ hṛdi nidhāya rāmābhidaḥ /
girīśanagare vare bhujabhujeś(ṣ)ucandrair n(m)ite
śake viniramād imaṃ khalu muhūrtacintāmaṇim //10//

Rāmabhūpāla, to whom the *Rāmavinoda* is dedicated, is called Rāmadāsa in verse VI. 14:

rāmeṇa yatnād iha rāmadāsa-
    prītyai kṛto rāmavinodanāmā /
jallāladīnākabarasya śākān
    nabhogasiddhiḥ paripūrtim āgāt / 14 //

This might be the Kacchwāha rāja Rāmadāsa who guarded the treasury for prince Salīm (Jahāngīr) in October 1605 as Akbar lay dying and who was among those sent by Jahāngīr in pursuit of Shāh Jahān in May 1623.

The era of Akbar is given by Rāmacandra as beginning in Saṃ. 1612, Śaka 1477 = A.D. 1555/6. In fact, Akbar was proclaimed emperor on 14 February 1556, and the epoch of his "Divine Era," which is introduced on Nawrūz of 1584, is 11 March 1556. The epoch of the *Rāmavinoda* is 35 years later; the kṣepakas in the tables described here indicate that it was 11 March 1590. The parameters of the tables belong to the Saurapakṣa.

II Manuscripts:

Tanjore D 11579 (Burnell 4271) 8ff. Copied in Saṃ. 1694 (read 1698), Śaka 1563 = A.D. 1642.
Benares (1963) 35077. 61ff. Copied in Śaka 1567 = A.D. 1645 (Mars).
BORI 986 of 1886/92. 18ff. Copied in Saṃ. 1713 = A.D. 1656.
Udaipur 128. 19ff. Copies in Saṃ. 1718 = A.D. 1661.
Leipzig 1079. 10ff. Copied in A.D. 1699.
*Oxford CS d. 776g. 4ff. Copied in Saṃ. 1760 = A.D. 1703.
Benares (1963) 35081. 61ff. Copied in Saṃ. 1766 = A.D. 1709 (Saturn).
Benares (1963) 36062. 300ff. Copied in Saṃ. 1766, Śaka 1631 = A.D. 1709.
GVS—(3944). Ff. 2-3. Copied in Saṃ. 1822 = A.D. 1765.
Benares (1963) 35069. 3ff. Copied in Śaka 1696 = A D 1774.
Baroda 3274. 5ff. Copied in Śaka 1724 = A.D. 1802.
*IO 2730. Ff. 1-6. Copied in Śaka 1729 = A.D. 1807.
BORI 204 of 1883/84. 21,. Copied in Saṃ 1867 = A.D. 1810.
AS Bengal 6907 (G 7906). 3ff. Copied in Sam. 1885 = A.D. 1828.

Baroda 1154. 25ff. Copied in Saṃ. 1896 = A.D. 1839
Jammu and Kashmir 3013-3014. 14ff. Copied in Saṃ. 1910 = A.D. 1853.
Alwar 1939. 2 copies.
Anup 4548. 5ff.
Anup 5058. 19ff.
Anup 5059. 60ff.
Anup 5060. 60ff.
Anup 5061. 60ff.
Anup 5062. 59ff.
Anup 5063. Ff. 2-22.
AS Bengal 6908 (G 7913). 3ff.
Baroda 3275. 13ff.
Baroda 3276. 4ff.
Benares (1963) 35078. 61ff. (Venus).
Benares (1963) 35079. 61ff. (Jupiter).
Benares (1963) 35080. 61ff. (Mercury)
Benares (1963) 35104. Ff. 1 and 3-4.
Benares (1963) 35226. 18ff. Incomplete.
Benares (1963) 35649. 300ff.
Berlin or. fol. 2795 (Pr SB 483). 17ff.
Bikaner 712. 355ff.
Bombay U Desai 1420. 15ff.
Bombay U Desai 1421. 4ff.
LDI 7174 (8976). 4ff.
N-W P IX (1885) A 26. 249ff. Property of Śyāmā Caraṇa of Benares.
*Oxford CS g. 17. F. 1.
SOI 787. 58ff.
SOI 7623.
VVRI 2272. 4ff. Incomplete.
VVRI 4534. 20ff. Incomplete.
WHMRL K.3.h.

III. Tables.

1. Table of yearly parameters (guṇakas), epoch positions (kṣepakas), and "collected multipliers" (labdhaguṇas) of the Lord of the year, tithi, nakṣatra, yoga, Lord of the year for the kendra, tithikendra, nakṣatrakendra, and yogakendra.

	guṇakāḥ	kṣepakāḥ	labdhaguṇāḥ
Lord of the year	1;15,31,31,24 days	——	——
Tithi	11;1,11,41,40	3;0,39,18	+ 1;0,59,5,20
Nakṣatra	10;1,18,3,12	2;6,55,41	− 1;1,0,42,12
Yoga	11;1,17,52,40	2;6,57,41	− 1;0,56,22,40
Lord of the year for the kendra	0;12,24,23	——	——
Tithikendra	7;36,17,54	21;48,0,0	+ 1;4,22,6,58
Nakṣatrakendra	7;43,13,32	21;0,34,0	− 1;6,6,32
Yogakendra	7;43,2,2	22;2,45,0	− 1;1,30,32

Manuscripts: Oxford CS d. 7769. f. 3r.

2. Table of yearly parameters and epoch positions expressed in terms of a set of 60 true longitude tables similar to those used in the *Mahādevī;* these tables may be those contained in Oxford CS g. 17 ff. 11r-108v. The epoch is 11 March 1590.

	guṇakāḥ	yearly mean motion
Mars	31;54,1,36 (× 6)	3,11;24,9,36°
Mercury's anomaly	9;7,33,0	54;45,18,0
Jupiter	5;3,31,0	30;21,6,0
Venus' anomaly	37;31,58,48	3,45;11,52,48
Saturn	2;2,8,24	12;12,50,24
Lunar node	56;46,27,54	5,40;38,47,24 (= 19;21,12,36)

(the lunar node parameter indicates N = 232,242 whereas in the normal Saurapakṣa it is 232,238).

	kṣepakāḥ	mean sidereal longitudes	true tropical longitudes	difference
Mars	4;47,40,55 (× 6)	28;46,5,30°	31°	− 2°
Mercury's anomaly	27;47,58,12	2,46;47,49,12	(Mercury) 19	
Jupiter	29;54,52,28	2,59;29,14,48	3,14	—15
Venus' anomaly	26;43,18,24	2,40;19,50,24	(Venus) 46	
Saturn	9;18,0,43	55;48,4,18	1,9	—14
Lunar node	19;4,6,10	1,54;24,37,0	2,11	—17

Manuscripts: Oxford CS d. 776g. f. 4r; Oxford CS g. 17 f. 1v.

The *Grahakaumudī* of Nṛsiṃha.

I. The Life of Nṛsiṃha.

Nṛsiṃha, the nephew and pupil of the famous Gaṇeśa who composed the *Grahalāghava* in Śaka 1442 = A.D. 1520, was born in Śaka 1470 = A.D. 1548. He is well-known as the author of a

vivaraṇa on his father's *Kālanirṇayadīpikā*; a *Grahadaśāphala*; a *Khetamuktāvali*; a *Varṣaphaladīpikā*; and a *Hillājadīpikā*. In the present work he refers to his genealogy and birth-date in IV. 11-12:

sahyādrer adharāparāntaviṣaye kṣārāmbudheḥ prāktaṭe
grāme nandipadādime sukadalīsa (?) śīrṣapūgānvite /
āsīt kauśikavaṃśabhūṣaṇamaṇiḥ śrīkeśavo daivavin
nānāśāstrakalākalāpacaturaḥ saujanyaratnākaraḥ //11//

tatputro vividhāgamārthakuśalo rāmo grahajñāmaṇis (?)
tatputro 'jani khādrivāsavamite śāke nṛsiṃhābhidhaḥ /
sadbuddhiḥ svapitṛvyato guruganeśāt prāpya bodhāṃśakaṃ
teneyaṃ grahakaumudī viracitā daivajñasantuṣṭaye //12//

Hence Nṛsiṃha, the pupil of his uncle Gaṇeśa, was born in Śaka 1470 as son of Rāma, who was the son of Keśava of the Kauśika-gotra, an astrologer who lived in the village Nandipadādima (Nandad, Gujarāt) on the eastern shore of the salt ocean (Arabian Sea) in Aparānta below the Sahyādri Range.

In I.8 he refers to the date Śaka 1510 = AD. 1588, and after I there is a table of guṇakas and of kṣepakas for this date.

	Guṇakas	Guṇakas × 13;20'
Lord of the year	1;15,31,30 days	
Epact	11;3,53,23 tithis	
Mars	14;21,18,45	3,11;24,10
Mercury's anomaly	4;6,24,0	54;45,20
Jupiter	2;16,34,30	30;21,0
Venus' anomaly	16;53,21,45	3,45;11,30
Saturn	0;54,58,3	12;12,54
Lunar node	– 1;27,6,45	–19;21,30

These agree with table 7.

The kṣepakas indicate the date Sunday 31 March 1588 Julian.

	kṣepakas		mean sidereal longitudes	true tropical longitudes	differences
Lord of the year	0;3,33				
Epact	12;59,28				
Mars	0;36,4	(× 13;20)	8;0,53,20	29	–21
Mercury's anom.	4;54,31		1, 5;26,53,20	(Mercury) 35	
Jupiter	8;46,12		1,56;55,0,0	2,7	–10
Venus' anom.	5;11,6		1, 9;8,0,0,	(Venus) 48	
Saturn	2;43,25		36;18,53,20	46	–10
Lunar node	–15;41,46		–3,29;16,53,20	–3,12	–17

However, in IV. 1 he refers to Śaka 1525 = A.D. 1603, and the kṣepakas in table 7 indicate that the epoch date is Thursday 31 March 1603:

	kṣepakas	mean sidereal longitudes	true tropical longitudes	differences
Lord of the year	4;56,25 days			
Epact	28;57,48 tithis			
Mars	26;55,45 (× 13;20)	5,59;3,20,0	22°	−23°
Mercury's anom.	12;30,31	2,46;46,53,20	(Mercury) 20	
Jupiter	15;54,49	3,32;10,53,20	3,51	−19
Venus' anom.	15;31,32	3,27;0,26,40	(Venus) 5,39	
Saturn	16;27,55	3,39;32,13,20	4,3	−23
Lunar node	−10;28,27	−2,19;30,20,0	−2,2	−18

The sidereal longitude of the Sun on 31 March 1603 was 0°; that of the Moon should be 0° increased by the epact × 12 or 5,47;33,36° ~ 5,48°. In fact the tropical longitude of the Moon at 9 P.M. in Ujjain on 31 March 1603 was 10°, thereby allowing very nicely for the difference between the two zodiacs.

II. Manuscripts:

*IO 2083d and e. 3ff. and 71ff.

III. Tables:

The tables of planetary longitudes are constructed on the same principle as are those for the *Mahādevī* of Mahādeva. The main difference lies in the fact that the intervals between tables is 13;20° (a nakṣatra) in the *Grahakaumudī*, 6° in the *Mahādevī*. That is, for k = 1 of table N = 0, the mean longitudes of both the planet (for the inner planets, their anomalies) and the Sun are 0°; but for k = 1 of table N = 1, the mean longitude of the planet is 13;20° while that of the Sun remains at 0°. Thus there are 27 tables (N = 0 to 26) for each planet.

Each table contains 7 columns. Column 1 indicates the avadhis (k = 1 to 27). Column 2 gives the planet's true longitude to the second. Column 3 gives the difference in the longitude of the planet for the same avadhi k between tables N and N + 1. Column 4 indicates the daily progress of the planet; it is computed by dividing the difference between the longitudes in avadhis k

and k + 1 by 14. Column 5 gives the difference between the entries in column 5 for the same avadhi k in tables N and N + 1. Column 6 indicates the avadhi and the day within it at which heliacal risings (u<daya>), heliacal settings (a<sta>), and stations (va<kra>) occur. And column 7 gives the increase in days between the occurrence of one of these phenomena on table N and the occurrence of the same phenomenon on table N + 1.

1. Tables for Mars.
Manuscripts: IO 2083e. ff. 1r–14r.

2. Tables for Mercury.
Manuscripts: IO 2083e. ff. 14v–27v.

3. Tables for Jupiter.
Manuscripts: IO 2083e. ff. 28r–41r.

4. Tables for Venus.
Manuscripts: IO 2083e. ff. 41v–54v.

5. Tables for Saturn.
Manuscripts: IO 2083e. ff. 55r–68r.

6. Table of the true longitude of the Sun for 1 to 27 avadhis. There are 7 columns. Column 1 lists the 1 to 27 avadhis. Column 2 gives the longitude of the Sun; that for k = 1 is 2;7°, that for k = 27 is 0;53°, which would indicate motion of 5,58;46° in 26 × 14 = 364 days. Column 3 gives the daily progress of the Sun; the maximum is 1;1,28° at k = 20, the minimum 0;57,0° at k = 6 and 7. Column 4 gives the caraphala (equation of daylight). Column 5 gives the deśāntara (longitudinal difference from the prime vertical of Ujjayinī). Column 6 indicates the dvisaṃskṛti (equation of time). And column 7 gives the sarvasaṃskāra (the sum of columns 4, 5, and 6). I give below columns, 1, 4, 5, 6, and 7.

avadhi	caraphala	deśāntara	dvisaṃskṛti	sarvasaṃskāra
1	+ 27	30	− 11	− 14
2	44	30	+ 1	+ 15
3	58	30	6	34
4	72	30	11	53
5	78	30	3	51
6	84	30	+ 1	55
7	80	30	− 3	47
8	74	30	9	35

9	64	30	11	23
10	50	30	8	12
11	34	30	– 3	+ 1
12	+ 16	30	+ 9	– 5
13	– 2	30	21	11
14	20	30	29	21
15	32 (read 39)	30	41	28
16	54	30	39	45
17	69	30	37	62
18	77	30	26	81
19	83	30	+ 10	103
20	80	30	– 7	117
21	84 (read 74)	30	22	126
22	62	30	36	128
23	47	30	38	115
24	30	30	40	100
25	9	30	32	71
26	+ 7	30	23	46
27	+ 25	– 30	– 12	– 17

Manuscripts: IO 2083e. f. 68v.

7. Table of mean motions: śeṣa (single years) 0 to 40. Tabulated are the Lord of the year (a<bdapa>), the Epact (śu<ddhi>), Mars (ma<ṅgala>), Mercury's anomaly (bu<dha>), Jupiter (gu<ru>), Venus' anomaly (śu<kra>), Saturn (śa<ni>), and the lunar node (rā<hu>). The entries for the Lord of the year are days (mod. 7), for the Epact tithis (mod. 30), and for the other entities true motion tables (mod. 27). The entries for 0 are the epoch positions given above. The yearly mean motions are:

	yearly motions	
Lord of the year	1;15,31,30 days	
Epact	11;3,53,19,30 tithis	
Mars	14;21,19 (×13;20)	3,11,24,13,20
Mercury's anomaly	4;6,24	54;45,20
Jupiter	2;16,34,30	30;21,0
Venus' anomaly	16;53,21,45	3,45;11,30
Saturn	0;54,58,3	12;12,54
Lunar node	—1;27,6,45	—19;21,30

Manuscripts: IO 2083e ff. 69r–70v.

8. Table of mean motions: labdha (collected years) for 1 to 10 = 40 to 400 years. The same entities are tabulated here as in

table 7. The parameters for 40-year motions are in some cases modified:

	table 7	table 8	yearly motions in table 8
Lord of the year	1;21,0 days	1;21,0 days	1;15,21,30 days
Epact	22;35,33 tithis	22;35,38 tithis	11;3,53,27 tithis
Mars	7;12,40	7;12,30	3,11;24,10
Mercury's anomaly	2;16,0	2;16,0	54;45,16
Jupiter	10;3,0	10;3,1	30;21,0,20
Venus' anomaly	0;34,30	0;34,30	3,45;11,30
Saturn	9;38,42	9;38,42	12;12,54
Lunar node	–4;4,30	–4;4,30	–19;21,30

The Mars parameter in table 8 and the Jupiter parameter in table 7 are correct.

Manuscripts: IO 2083e. f. 71r.

The *Tithikalpadruma* of Kalyāṇa.

I. The Life of Kalyāṇa.

The *Tithikalpadruma* in IO 2529e is evidently identical with the *Tithikalpadruma* or *Pañcāṅgapatraracanā* which was composed by Kalyāṇa, the son of Nṛsiṃha, at Dhammi-Maṅgalapura (presumably in Gujarāt). The text in IO 2529e (A f. 1v) informs us that the epoch is Śaka 1527 = A.D. 1605. On the same page are listed the guṇakas and kṣepakas according to the Brāhmapakṣa.

	guṇakas	kṣepaka
Epact	11;3,53,22,38 tithis	22;4,35,38,14 tithis
Lord of the year	1;15,31,17,17 days	0;24,3,42,16 days
Tithikendra	7;9,41,52,24 tithis	17;49,40,53,6 tithis
Nakṣatrakendra	6;58,0,14,23 tithis	17;23,14,21,5 tithis
Yogakendra	7;29,15,56,13 tithis	18;39,28,45,51 tithis

The kṣepaka of the epact multiplied by 12° will give the approximate sidereal longitude of the Moon when the Sun was at Aries 0° sidereal; that lunar sidereal longitude is 264;55,7,38,48°. The Moon's true tropical longitude on 31 March 1605, a Sunday, at noon in Ujjain was *ca.* 287°.

Tables 1 to 4, however, provide a different set of kṣepakas modified by bījas. These are for a Thursday, but it is not clear what calendar date is involved.

	kṣepakas
Epact	23;45,40,50 tithis
Lord of the year	4;43,14,30 days
Moon	285;8,10°
Lunar apogee	286;14,0°

Note that the given lunar longitude — 285;8,10° — is exactly equal to 23;45,40,50 × 12°. Therefore, the Sun was at Aries 0° and these kṣepakas are computed for the beginning of a sidereal year.

A passage on IO 2529e. A f. 8v refers to Gurjjara and, in Saurāṣṭra, Kṛtera and Pūphāra. This confirms the evidence of the provenance of the manuscript that the *Tithikalpadruma* was composed in Gujarāt.

II. Manuscripts:

As Bombay 236. 2ff. Copied in Saṃ. 1743 = A.D. 1686.
BORI 651. 17ff. Copied in Saṃ. 1807 = A.D. 1750.
BORI 666. 10ff. Copied in Saṃ. 1819 = A.D. 1762.
Baroda 3181. 5ff.
*IO 2529e. Ff. 1–8 and ff. 8–10 and 10bis–22.
LDI 6912 (4444). 3ff.
PL. Buhler IV E 181. 4ff. Property of Jīvanakuśala Gorajī of Bhuja. Bühler notes the existence of three other copies.
BORI 4744. 15ff.

III. Tables.

The mean motion tables (1 to 4) on B f. 8 are arranged for 1 to 9, 10 to 90, 100 to 500, and 1,000 years; kṣepakas corrected by bījas are also given. These tables are not from the *Tithikalpadruma*.

1. Table of the Epact; the yearly parameter is 11;3,53,22,40 tithis.
Manuscripts: IO 2529e. B f. 8r.

2. Table of the Lord of the year; the yearly parameter is 1;15,31,17,17 days.
Manuscripts: IO 2529e B f. 8r.

3. Table of the mean motion of the Moon; the yearly mean motion is 132;46,40,32°.
Manuscripts: IO 2529e. B f. 8v.

4. Table of the mean motion of the lunar apogee; the yearly mean motion is 40;40,31,14°. This is the computer's mistake; for the yearly motion of the Moon minus the yearly motion of its anomaly—2,12;46,40,32—1,32;6,8,48—is 40;40,31,44°.
Manuscripts: IO 2529e. B. f. 8v.

5. Table of tithikendras (modulo 27;59,33) and of week-days with their respective cālakas for 1 to 38 periods of 10 days. This is table 5 of the *Pañcāṅgavidyādharī*, table 11 of the Anonymous of 1741 (*SATIUS*, pp. 67a–68b).
Manuscripts: IO 2529e. B ff. 9r–9v.

Tables 6 to 9 on B f. 10 do not belong to the *Tithikalpadruma*.

6. Table of nakṣatrakendras (modulo 27;13,48) for 1 to 14 periods of 27 days. Cf. table 6 of the *Pañcāṅgavidyādharī*, table 12 of the Anonymous of 1741.
Manuscripts: IO 2529e. B. f. 10v.

7. Table of the nakṣatravāra for 1 to 14 periods of 27 days with a cālaka. Cf. table 6 of the *Pañcāṅgavidyādharī*, table 12 of the Anonymous of 1741; cf. also table 7 of the *Makaranda*.
Manuscripts: IO 2529e. f. 10v.

8. Table of the yogakendra (modulo 29;16,1) for 1 to 15 periods of 27 days with a cālaka. Cf. table 7 of the *Pañcāṅgavidyādharī*, table 13 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 10v.

9. Table of the yogavāra for 1 to 15 periods of 27 days with a cālaka. Cf. table 7 of the *Pañcāṅgavidyādharī*, table 13 of the Anonymous of 1741; cf. also table 11 of the *Makaranda*.
Manuscripts: IO 2529e. B f. 10v.

10. Table of nakṣatrakendras (modulo 27;13,48) and nakṣatravāras for 1 to 41 periods of 9 days with their respective cālakas. This is table 6 of the *Pañcāṅgavidyādharī*, table 12 of the Anonymous of 1741.
Manuscripts: IO 2529e. B ff. 10bis r-10bis v.

11. Tables of the Epact for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 11;3,53,22,39 tithis; the epoch position 22;4,35,38,14 tithis (the kṣepaka for 1605). Cf. table 1 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 11r.

12. Tables of the Lord of the year for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 1;15,31,17,17; the epoch position 0;24,3,42,16 (the kṣepaka for 1605). Cf. table 2 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 11v.

13. Table of the tithidhruva (modulo 30) for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 10;56,6,37,21 tithis; the epoch position 22;55,24,21,46 tithis. The parameter equals 11–0;3,53,22,39 tithis. Cf. table 3 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 12r.

14. Tables of the nakṣatrayogadhruva (modulo 27) for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 10;2,29,57,36,54 nakṣatras; the epoch position 19;1,51,55,35 nakṣatras. The Moon travels 11;3,53,22,39 $\times$ 12° = 2,12;46,40,31,48° per year, which, when divided by 13;20, is 9;57,30,2,23,15 .... nakṣatras. The yearly parameter equals 11–0;57,30,2,23,16. Cf. table 4 of the Anonymous of 1741.
Manuscripts: IO 2529e. B. f. 12v.

15. Tables of the tithikendra (modulo 27;59,33) for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 7;5,48,29,45 tithis, the epoch position 18;45,5,14 tithis. Cf. table 5 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 13r.

16. Tables of the nakṣatrakendra (modulo 27;13,48) for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is 7;0,30,12,0 nakṣatras, the epoch position 17;25,6,16 nakṣatras. Cf. table 6 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 13v.

17. Tables of the yogakendra (modulo 29;16,1) for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter

is 7;31,45,53,49 yogas, the epoch position 18;41,20,41 yogas. Cf. table 7 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 14r.

18. Tables of the tithivāra for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is approximately 1;11,41, 34 days, the epoch position 1;19,56,7 days. Cf. table 8 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 14v.

19. Tables of the nakṣatravāra for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is approximately 1;18,3,1 days, the epoch position 0;27,11,56 days. Cf. table 9 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 15r.

20. Tables of the yogavāra for 1 to 30 periods of 30 years and for 0 to 29 years. The yearly parameter is approximately 1;17,52,25 days, the epoch position 0;26,59,3 days. Cf. table 10 of the Anonymous of 1741.
Manuscripts: IO 2529e. B f. 15v.

21. Table of corrections to the tithikendra for 0 to 27 days horizontal, and, in intervals of 3, for 0 to 57 ghaṭīs vertical. The maximum correction is 24;47 ghaṭīs for 24;21 days of anomalistic motion. Cf. table 9 of the *Pañcāṅgavidyādharī*, table 16 of the Anonymous of 1741.
Manuscripts: IO 2529e. B ff. 16r–17v.

22. Table of corrections to the nakṣatrakendra for 0 to 27 days horizontal, and, in intervals of 3, for 0 to 57 ghaṭīs vertical. The maximum correction is 22;56 ghaṭīs. Cf. table 10 of the *Pañcāṅgavidyādharī*, table 17 of the Anonymous of 1741.
Manuscripts: IO 2529e. B ff. 18r-19v.

23. Table of corrections to the yogakendra for 0 to 29 days horizontal, and, in intervals of 3, 0 to 57 ghaṭīs vertical. The maximum correction is 21;21 ghaṭīs. Cf. table 11 of the *Pañcāṅgavidyādharī*, table 18 of the Anonymous of 1741.
Manuscripts: IO 2529e. B ff. 20r–21v.

24. Table of the tithis and week-days on which the Sun enters each of the 27 nakṣatras according to the Brāhmapakṣa. The entries

for the week-days are those of table 8 of the Anonymous of 1638 (*SATIUS*, pp. 59b–60b).
Manuscripts: IO 2529e. B f. 22r.

25. Table of the tithis and week-days on which the Sun enters the twelve zodiacal signs according to the Brāhmapakṣa. The entries for the week-days are those of table 3 of the Anonymous of 1594 (*SATIUS*, pp. 54a-55a).
Manuscripts: IO 2529e. B f. 22r.

The *Ravisiddhāntamañjarī* of Mathurānātha Śarman.

I. The Life of Mathurānātha Śarman.

Mathurānātha wrote the *Ravisiddhāntamañjarī* in Śaka 1531 = A.D. 1609 as we learn from I. 1-2:

praṇipatya jagadvilocanaṃ ravisiddhāntamanojñamañjarī /
abahujñasukhāvabodhaye mathurānāthasatā vitanyate // 1 //

iṣṭaḥ śakābdaḥ śaśirāmabāṇarūpair viśuddhaḥ kathito 'bdapiṇḍaḥ /
vārādivṛttaṃ viṣuvasya rāmā navakṣitī pakśaśarā yugāgnī // 2 //

The date is confirmed by the mean positions given at the beginning of tables 3, 5, 7, 9, 11, 13, 15, 17 and 19 to be Wednesday, 29 March 1609 Julian at *ca.* noon.

	mean sidereal longitudes	true tropical longitudes	differences
Lord of the year	3;19,52,34 days		
Moon	35;53,50	1,10	−35
Mars	1,5;25,39	1,6	−1
Mercury's anomaly	2,7;12,14	(Mercury) 35	
Jupiter	36;10,14	49	−13
Venus' anomaly	1,59;0,25	(Venus) 1,1	
Saturn	4,47;52,5	5,10	−22
Lunar node	4,16;24,13	−3,58	−18
Lunar apogee	3,9;26,11		

The *Ravisiddhāntamañjarī*, which belongs to the Saurapakṣa, consists of the following sections: Madhyaśighrādinirṇaya, Sphuṭatithyādinirṇaya, Vakrāstādivinirṇaya, and Grahaṇādhikāra. It was edited by Viśvambhara Jyotiṣārṇava, *BI* 198, Calcutta 1911, an edition which we have followed in describing the tables.

II. Manuscripts:

Paris BN 997 (Sans. Bengali 206) II. Copied in A.D. 1788.
AS Bengal 6945 (G 4595). 12ff.
AS Bengal 6946 (G 3958). 11ff.
Benares (1963) 37104, 17ff.
IO 1492a (Eggeling 2904). 25ff.
*TC R. 15. 108. 20ff.
WHMRL. Y. 45. 18ff.

III. Tables.

1. Table of the natadviguṇalambana (parallax) for 1 to 36. The maximum is 4;52 ghaṭikās at 36. A column of differences is added.
Manuscripts: TC R. 15 108 f. 10v.

2. Table of phala for 1 to 27. The maximum is 5;31 at 27. A column of differences is added.
Manuscripts: TC R. 15 108 f. 10v.

3. Table of the year (viṣuva) for 20-year intervals from Śaka 1531 to 1911 = A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 17v.

4. Table of the Lord of the year for 1 to 20 years. The yearly parameter is 1;15,31,31,24 days.
Manuscripts: TC R. 15. 108 f. 17v.

5. Table of the mean motion of Moon for 20-year intervals from Śaka 1531 to 1911 = A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 17v.

6. Table of the mean motion of the Moon for 1 to 20 years. The yearly mean motion is 2,12;46,40,48°.
Manuscripts: TC R. 15. 108 f. 17v.

7. Table of the mean motion of Mars for 20-year periods form Śaka 1531 to 1911 = A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 17v.

8. Table of the mean motion of Mars for 1 to 20 years. The yearly mean motion is 3,11;24,9,36°.
Manuscripts: TC R. 15. 108 f. 18r.

9. Table of the mean motion of Mercury's anomaly for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 18r.

10. Table of the mean motion of Mercury's anomaly for 1 to 20 years. The yearly mean motion is 54;45,18°.
Manuscripts: TC R. 15. 108 f. 18r.

11. Table of the mean motion of Jupiter for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 18r.

12. Table of the mean motion of Jupiter for 1 to 20 years. The yearly mean motion is 30;21,6°.
Manuscripts: TC R. 15. 108 f. 18r.

13. Table of the mean motion of Venus' anomaly for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 18r.

14. Table of the mean motion of Venus' anomaly for 1 to 20 years. The yearly mean motion is 3,45;11,49,12 .
Manuscripts: TC R. 15. 108 f. 18v.

15. Table of the mean motion of Saturn for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 18v.

16. Table of the mean motion of Saturn for 1 to 20 years. The yearly mean motion is 12;12,50,24°.
Manuscripts: TC R. 15. 108 f. 18v.

17. Table of the motion of the lunar node for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 18v.

18. Table of the motion of the lunar node for 1 to 20 years. The yearly motion is −19;21,12,36°.
Manuscripts: TC R. 15. 108 f. 18v.

19. Table of the motion of the lunar apogee for 20-year periods from Śaka 1531 to 1911 — A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 19r.

20. Table of the motion of the lunar apogee for 1 to 20 years. The yearly motion is 40;41,0,54°.
Manuscripts: TC R. 15. 108 f. 19r.

21. Table of the annual excess over 360 days for 20-year periods from Śaka 1531 to = A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 19r.

22. Table of the annual excess over 360 days for 1 to 20 years. The annual excess is 5;15,31,30 days, the ārdharātrika parameter, instead of 5;15,31,31,24 days as required from table 4.
Manuscripts: TC R. 15. 108 f. 19r.

23. Table of the excess of one year over the time necessary for Jupiter to travel 30°, which time is a Jovian year in 60-year cycle, for 20-year periods from Śaka 1531 to 1911 = A.D. 1609 to 1989.
Manuscripts: TC R. 15. 108 f. 19r.

24. Table of the excess of a solar year cover a Jovian year for 1 to 20 years. The excess is 4;12,43,12 days. However, using 0;4,59,9° as Jupiter's mean daily motion one finds an excess of 4;14,9,5,24 days; Mathurānātha's excess implies a mean daily motion of 0;4,59,18°.
Manuscripts: TC R. 15. 108 f. 19r.

25. Table of the Lord of the year (viṣuva)) for 20-year periods from Śaka 1431 to 1511 = A.D. 1509 to 1589. Tables 26 to 34 are all set up in this way also.
Manuscripts: TC R. 15. 108 f. 19v.

26. Table of the mean motion of the Moon.
Manuscripts: TC R. 15. 108 f. 19v.

27. Table of the mean motion of Mars.
Manuscripts: TC R. 15. 108 f. 19v.

28. Table of the mean motion of Mercury's anomaly.
Manuscripts: TC R. 15. 108 f. 19v.

29. Table of the mean motion of Jupiter.
Manuscripts: TC R. 15. 108 f. 19v.

30. Table of the mean motion of Venus' anomaly.
Manuscripts: TC R. 15. 108 f. 19v.

31. Table of the mean motion of Saturn.
Manuscripts: TC R. 15. 108 f. 19v.

32. Table of the motion of the lunar node.
Manuscripts: TC R. 15. 108 f. 19v.

33. Table of the motion of the lunar apogee.
Manuscripts: TC R. 15. 108 f. 19v.

34. Table of the annual excess of the solar over the Jovian year.
Manuscripts: TC R. 15. 108 f. 19v.

35. Table of the mean motion of the Sun for 1 to 30 days The mean daily motion is 0;59,8,10,10°.
Manuscripts: TC R. 15. 108 f. 15v.

36. Table of the mean motion of the Sun for 30-day intervals from 60 to 360 days and for 365 days.
Manuscripts: TC R. 15. 108 f. 15v.

37. Table of the mean motion of the Moon for 1 to 30 days. The mean daily motion is 13;10,34,52°.
Manuscripts: TC R. 15. 108 f. 15v.

38. Table of the mean motion of the Moon for 30 day periods from 60 to 360 days and for 365 days.
Manuscripts: TC R. 15. 108 f. 16r.

39. Table of the mean motion of the Moon for 1 to 60 daṇḍas (a daṇḍa is 0;1 days).
Manuscripts: TC R. 15. 108 f. 16r.

40. Table of the mean motion of Mars for 1 to 30 day periods from 40 to 60 days, for 30-day periods from 90 to 360 days, and for 365 days; moving the sexagesimal place one place to the left yields the mean motions for daṇḍas. The daily mean motion is 0;31,26,28°.
Manuscripts: TC R. 15. 108 f. 16r.

41. Table of the mean motion of Mercury's śighra for 1 to 30 days. The daily mean motion is 4;5,32,21,29°.
Manuscripts: TC R. 15. 108 f. 16r.

42. Table of the mean motion of Mercury's śighra for 30-day periods from 60 to 360 days for 365 days.
Manuscripts: TC R. 15. 108 f. 16v.

43. Table of the mean motion of Mercury's śighra for 1 to 60 daṇḍas.
Manuscripts: TC R. 15. 108 f. 16v.

44. Table of the mean motion of Jupiter set up as is table 40. The daily mean motion is 0;4,59,9°.
Manuscripts: TC R. 15. 108 f. 16v.

45. Table of the mean motion of Venus' śīghra set up as is table 40. The daily mean motion is 1;36,7,43°.
Manuscripts: TC R. 15. 108 ff. 16v–17r.

46. Table of the mean motion of Saturn set up as is table 40. The daily mean motion is 0;2,0,23°.
Manuscripts: TC R. 15. 108 f. 17r.

47. Table of the motion of the lunar node for 1 to 30 days. The daily motion is −0;3,10,44°.
Manuscripts: TC R. 15. 108 f. 17r.

48. Table of the motion of the lunar node for 30-day periods from 60 to 360 days and for 365 days.
Manuscripts: TC R. 15. 108 f. 17r.

49. Table of the motion of the lunar apogee set up as is table 40. The daily motion is 0;6,41°.
Manuscripts: TC R. 15. 108 ff. 17r–17v.

50. Table of the manda equation of the Sun for 1° to 180°. The maximum is 2;10,31° at 90°. The apogee is at Gemini 17;16,54°.
Manuscripts: TC R. 15. 108 f. 11r.

51. Table of the manda equation of the Moon for 1° to 180°. The maximum is 5;2,46° at 90°.
Manuscripts: TC R. 15. 108 f. 11v.

52. Table of half of the śīghra equation of Mars for 1° to 180°. The maximum is 20;8° at 129° to 132°; the maximum equation 40;16°.
Manuscripts: TC R. 15. 108 f. 12.

53. Table of the manda equation of Mars for 1° to 180°. The maximum is 10;32° at 94° to 98°. The apogee is at Leo 10;2,24°.
Manuscripts: TC R. 15. 108 ff. 12r–12v.

54. Table of half of the śīghra equation of Mercury for 1° to 180°. The maximum is 10;46° at 109°; the maximum equation 21;32°.
Manuscripts: TC R. 15 108 ff. 12v–13r.

55. Table of the manda equation of Mercury for 1° to 180°. The maximum is 4;28° at 90° to 91°. The apogee is at Scorpio 10;17,51°.
Manuscripts: TC R. 15. 108 ff. 13r–13v.

56. Table of half of the śīghra equation of Jupiter for 1° to 180°. The maximum is 5;46° at 99° to 100°; the maximum equation 11;32°.
Manuscripts: TC R. 15. 108 f. 13v.

57. Table of the manda equation of Jupiter for 1° to 180°. The maximum is 5;6° at 92° to 94°. The apogee is at Virgo 21;21,11°.
Manuscripts: TC R. 15. 108 f. 14r.

58. Table of half of the śīghra equation of Venus for 1° to 180. The maximum is 23;12° at 135° to 138°; the maximum equation 46;24°.
Manuscripts: TC R. 15. 108 ff. 14r–14v.

59. Table of the manda equation of Venus for 1° to 180°. The maximum is 1;45° at 83° to 98°. The apogee is at Gemini 19;51,38°.
Manuscripts: TC R. 15. 108 f. 14v.

60. Table of half of the śīghra equation of Saturn for 1° to 180°. The maximum is 1;31° at 92° to 99°; the maximum equation 3;2°.
Manuscripts: TC R. 15. 108 ff. 14v–15r.

61. Table of the manda equation of Saturn for 1° to 180°. The maximum is 7;40° at 94 to 95°. The apogee is at Scorpio 26;37,31°.
Manuscripts: TC R. 15. 108 ff. 15r–15v.

The *Grahasāraṇī* of Gaṅgādhara.

I. The Life of Gaṅgādhara.

Gaṅgādhara, the son of Bhairava of the Bhāradvājagotra and the pupil of Divākara, resided in Kāśī (Benares), where he wrote a *Praśnabhairava* in Śaka 1551 = A.D. 1629; a *Paddhatisāra* in Śaka 1551 = A.D. 1629; a *Muhūrtālaṅkāra* in Śaka 1554 = A.D 1632; a *Muhūrtabhairava* in Śaka 1575 = A.D. 1653; and a

Tajikaratna in Śaka 1575 = A.D. 1653. The *Grahasāraṇī*, as is stated in the first two verses, was composed in Śaka 1552 = A.D. 1630:

śrīvighnapaṃ śrīgurum āśu natvā
tanoti sādhvīṃ grahalāghavasya /
tāṃ sāraṇīṃ vijñamude pratītyai
gaṅgādharaḥ khecaraśīghrasiddhyai //1//

dvipañcapañcenduvihīnaśākaḥ
śivoddhṛtaś cakrasamākhyamāsām /
śeṣaṃ ravighnaṃ gatamāsayuktaṃ
pṛthag yutāś cakratithidvihatyā //2//

Verse 56 confirms that the author of the *Grahasāriṇī* is the well-known son of Bhairava:

bhāradvājamahānvaye jananatāṃ prāpnoti vikhyātibhāk
śrīmadbhairavadaivavid bhuvi paraṃ jātaḥ satām agraṇīḥ /
tajjātena divākarāptamatinā gaṅgādhareṇeritā
prāptā khecaraśīghrasiddhir akhilā santuṣṭaye pūrṇatām
//56//

The date indicated by the kṣepakas given in tables 1, 4, 7, 10, 13, 16, 19, 22, and 25 is 1 March 1630, which is exactly 10 periods of 4016 days after 18 March 1520, the epoch of Gaṇeśa's *Grahalāghava*.

	kṣepakas	true tropical longitudes	differences
Sun	5,31;29,10°	5,51°	−20′
Moon	5.11;24,10,59	5,26	−15
Lunar apogee	5,20;3.0		
Mars	..1,51;48	1,37	+15
Mercury's anom.	1,55;3	(Mercury) 10	
Jupiter	5, 9;6	5.27	−16
Venus' anom.	2,29;49	(Venus) 36	
Saturn	3, 8;21	3,35	−27
Lunar node	59;18	1,17	−18

The parameters confirm the text's statement that the tables are based on the Gaṇeśapakṣa.

II. Manuscripts:

Benares (1963) 35917. 4ff. Copied in Saṃ. 1947, Śaka 1812 = A.D. 1890.

*BM Add. 14,363a. 15ff.
*BM Add. 14,365g. 13ff.

III. Tables.

The mean motion tables are for 0 to 59 days (the entry for 0 days is the kṣepaka); for 1 to 75 periods of 60 days; and of the dhruvas (these equal 360° diminished by the mean motion in 4016 days) for 1 to 20 periods of 4016 days.

The mean daily motions (rounded off) are:

Sun	0;59,8,10,17	Jupiter	0;4,59,8,34
Moon	13;10,34,51,56	Venus' anomaly	0;36,59,40,7
Lunar apogee	0;6,40,51,26	Saturn	0;2,0,23,5
Mars	0;31,26,31,4	Lunar node	5,56;49,11,35
Mercury's anomaly	3;6,24,8,7	Lunar node	—0;3,10,48,25

1. Table of the mean motion of the Sun for 0 to 59 days.
Manuscripts: BM Add. 14,363a. f. 3r; BM Add. 14,365g. f. 3r.

2. Table of the mean motion of the Sun for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. ff. 2v–3r; BM Add. 14,365g. ff. 2v–3r.

3. Table of the mean motion of the dhruva of the Sun for 1 to 20 periods of 11 "years," or 4016 days. The motion in 1 period is 1;49,11,0°.
Manuscripts: BM Add. 14,363a. f. 3r; BM Add. 14,365g. f. 3r.

4. Table of the mean motion of the Moon for 0 to 59 days.
3r–3v.
Manuscripts: BM Add. 14,363a. ff. 3r–3v; BM Add. 14,365g. ff.

5. Table of the mean motion of the Moon for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. f. 3v; BM Add. 14,365g. f. 3v.

6. Table of the mean motion of the dhruva of the Moon for 1 to 20 periods of 11 "years." The motion in 1 period is 3;46,11,0°.
Manuscripts: BM Add. 14,363a. ff. 3v–4r; BM Add. 14,365g. f. 4r.

7. Table of the mean motion of the lunar apogee for 0 to 59 days.
Manuscripts: BM Add. 14,363a. f. 4r; BM Add. 14,365g. f. 4r.

8. Table of the mean motion of the lunar apogee for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. ff. 4r–4v; BM Add. 14,365g. ff. 4r–4v.

9. Table of the mean motion of the dhruva of the lunar apogee for 1 to 20 periods of 11 "years." The motion in 1 period is 4,32;45,0°.
Manuscripts: BM Add. 14,363a. f. 4v; BM Add. 14,365g. f. 4v.

10. Table of the mean motion of Mars for 0 to 59 days.
Manuscripts: BM Add. 14,363a. ff. 4v–5r; BM Add. 14,365g. f. 4v.

11. Table of the mean motion of Mars for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. f. 5r; BM Add. 14,365g. ff. 4v–5r.

12. Table of the mean motion of the dhruva of Mars for 1 to 20 periods of 11 "years." The motion in 1 period is 55;32,0°.
Manuscripts: BM Add. 14,363a. f. 5r; BM Add. 14,365g. f. 5r.

13. Table of the mean motion of Mercury's anomaly for 0 to 59 days.
Manuscripts: BM Add. 14,363a. ff. 5r–5v; BM Add. 14,365g. ff. 5r–5v.

14. Table of the mean motion of Mercury's anomaly for 1 to 75 periods of 60 days.

15. Table of the mean motion of the dhruva of Mercury's anomaly for 1 to 20 periods of 11 "years." The motion in 1 period is 2,3;27,0°.
Manuscripts: BM Add. 14,363a. f. 6r; BM Add. 14,365g. f. 5v.

16. Table of the mean motion of Jupiter for 0 to 59 days.
Manuscripts: BM Add. 14,363a. f. 6r; BM Add. 14,365g. ff. 5v–6r.

17. Table of the mean motion of Jupiter for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. ff. 6r–6v; BM Add. 14,365g. f. 6r.

18. Table of the mean motion of the dhruva of Jupiter for 1 to 20 periods of 11 "years." The motion in 1 period is 26;18,0°.
Manuscripts: BM Add. 14,363a. f. 6v; BM Add. 14,365g. f. 6v.

19. Table of the mean motion of Venus' anomaly for 0 to 59 days.
Manuscripts: BM Add, 14,363a. ff. 6v.-7r; BM Add. 14,465g. f. 6v.

20. Table of the mean motion of Venus' anomaly for 1 to 75 periods of 75 days.
Manuscripts: BM Add. 14,363a. f. 7r; BM Add. 14,365g. ff. 6v. 7r.

21. Table of the mean motion of the dhruva of Venus' anomaly for 1 to 20 periods of 11 "years." The motion in 1 period is 44;2,0°.
Manuscripts: BM Add. 14,363a. ff. 7r–7v; BM Add. 14,365g. f. 7r.

22. Table of the mean motion of Saturn for 0 to 59 days.
Manuscripts: BM Add. 14,363a. f. 7v; BM Add. 14,365g. f. 7r.

23. Table of the mean motion of Saturn for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. ff. 7v–8r; BM Add. 14,365g. f. 7v.

24. Table of the mean motion of the dhruva of Saturn for 1 to 20 periods of 11 "years." The motion in 1 period is 3,45;42,0°.
Manuscripts: BM Add. 14,363a. f. 8r; BM Add. 14,365g. f. 7v.

25. Table of the mean motion of the lunar node for 0 to 59 days.
Manuscripts: BM Add. 14,363a. ff. 8r–8v; BM Add. 14,365g. ff. 7v-8r.

26. Table of the mean motion of the lunar node for 1 to 75 periods of 60 days.
Manuscripts: BM Add. 14,363a. f. 8v; BM Add. 14,365g. f. 8r.

27. Table of the mean motion of the dhruva of the lunar node for 1 to 20 periods of 11 "years." The motion in 1 period is 3,32;50,0°.
Manuscripts: BM Add. 14,363a. f. 8v; BM Add. 14,365g. ff. 8r-8v.

The tables of equations give only the arguments and corresponding equations except that that for the equation of the center of the Sun gives also the longitude of the solar apogee (Gemini 19°) and that those for the equations of the center of the Sun and Moon and the equation of the conjunction of Mars add a column giving the increment to (or decrease from) the mean daily motion.

28. Table of the equation of the center of the Sun for 0° to 90; the maximum equation is 2;10,45° at 90°, the maximum increment 0; 2,15° at 0°.
Manuscripts: BM Add. 14,363a. ff. 8v-9r; BM Add. 14.365g. f. 8v.

29. Table of the equation of the center of the Moon for 0° to 90°; the maximum equation is 5;1,40° at 90°, the maximum increment 1;8,15° at 1°.
Manuscripts: BM Add. 14,363a. ff. 9r-9v; BM Add. 14,365g. ff. 8v-9r.

30. Table of the equation of the conjunction of Mars for 0° to 180°; the maximum equation is 40;0,0° at 135°, the maximum increment 0;23,12° at 1°.
Manuscripts: BM Add. 14,363a. ff. 9v-10r; BM Add. 14,365g. ff. 9r-9v.

31. Table of the equation of the center of Mars for 0° to 90°; the maximum equation is 13;0,0° at 90°.
Manuscripts: BM Add. 14,363a. ff. 10r-10v; BM Add. 14.365g. f. 9v.

32. Table of the equation of the conjunction of Mercury for 0 to 180°; the maximum equation is 21;12° at 105° to 116°.
Manuscripts: BM Add. 14,363a. ff. 10v-11r; BM Add. 14.365g. ff. 9v-10r.

33. Table of the equation of the center of Mercury for 0° to 90°; the maximum equation is 3;36,0° at 90°.
Manuscripts: BM Add. 14.363a. ff. 11r-11v; BM Add. 14.365g. f. 10v.

34. Table of the equation of the conjunction of Jupiter for 0° to 180; the maximum equation is 10;47,12° (10;46,52° in 14,365) at 104°. One finds 10;48° in the Gaṇeśapakṣa.
Manuscripts: BM Add. 14.363a. ff. 11v.-12r; BM Add. 14,365g. ff. 10v-11r.

35. Table of the equation of the center of Jupiter for 0° to 90°; the maximum equation is 5;42,0° at 90°.
Manuscripts: BM Add. 14,363a. ff. 12r–12v; BM Add. 365g. ff. 11r–11v.

36. Table of the equation of the conjunction of Venus for 0° to 180°; the maximum equation is 46;6,0° at 135°.
Manuscripts: BM Add. 14,363a. ff. 12v–13r; BM Add. 14,365g. ff. 11v–12r.

37. Table of the equation of the center of Venus for 0° to 90°; the maximum equation is 1;30,0° at 90°.
Manuscripts: BM Add. 14,363a. f. 13r; BM Add. 14,365g. f. 12r.

38. Table of the equation of the conjunction of Saturn for 0° to 180°; the maximum equation is 5;42,0° at 90° to 105°.
Manuscripts: BM Add. 14,363a. ff 13r–14r; BM Add. 14,365g. ff. 12r–12v.

39. Table of the equation of the center of Saturn for 0° to 90; the maximum equation is 9;18,0° at 90°.
Manuscripts: BM Add. 14,363a. f. 14r; BM Add. 14,365g. ff. 12v–13r.

40. Table of the half-duration of lunar eclipses for 1 to 21 digits; the maximum duration is 4;42 ghaṭikās = 1;52,48 hours at 21 digits.
Manuscripts: BM Add. 14,363a. f. 14r; BM Add. 14,365g. f. 13r.

41. Table entitled: akṣāṃśāḥ dakṣi, i.e. "degrees of terrestrial latitude to the south." The argument is the length of the noon equinoctial shadow, the entry, the terrestrial latitude north or south.

1	4;54,1°	6	26;24,30°	11	42;54,55°	16	54;25,20°
2	9;36,10	7	30;6,25	12	45;37,0	17	56;7,25
3	14;6,15	8	33;36,40	13	48;7,13	18	57;37,30
4	18;24,20	9	36;54,46	14	50;25,10	19	58;54,25
5	22;30,25	10	40;0,50	15	52;31,19	20	60;0,40

Manuscripts: BM Add. 14,363a ff. 14r–14v; BM Add. 14,365g. f. 13r.

42. Table entitled: ravigrahe hārabhājyau, or "The divisor and the dividend in a solar eclipse."

0	12, 0	0, 0, 0			
1	12, 3	4, 6, 45	10	18,40	13,45, 0
2	12,12	23,13, 0	11	20,25	0,46,45
3	13,31	3,18,45	12	22,12	24,48, 0
4	13,49	30,24, 0	13	24, 3	0,48,45
5	13,30 (sic!)	21,28,45	14	26,12	0,14, 0
6	13,51	18,33, 0	15	28, 0	0,48,45
7	14,30	50,46,45	16	30,57	37,46, 0
8	15,57	1,40, 0	17	33,25	30,46,45
9	17,18	22,42,45	18	36, 0	37,45, 0

Manuscripts: BM Add. 14363a. f. 14v; BM Add. 14,365g. f. 13r.

43. Table of the declination of the Sun for 0° to 90°; the maximum declination is 24;0,0° at 90°.
Manuscripts: BM Add. 14,363a. f. 14v; BM Add. 14,365g. ff. 13r–13v.

44. Table of the latitude (śara) measured in digits in a lunar eclipse; the argument increases from 0 to 14° of elongation between the Moon and its node. Cf. table 4 of the *Karaṇakesari* (*SATIUS*, pp. 70b–72b). In fact this table is virtually a multiplication table of 1;34,15. I have added the column of differences.

arg.	śara	diff.	arg.	śara	diff.	arg.	śara	diff.
0	0;0		5	7;51	1;34	10	15;42	1;34
1	1;34	1;34	6	9;25	1;34	11	17;17	1;35
2	3;8	1;34	7	10;59	1;34	12	18;51	1;34
3	4;42	1;34	8	12;24	1;25	13	20;49	1;58
4	6;17	1;35		(12;34	1;35)		(20;25	1;34)
			9	14;8	1;34	14	22;0	1;35

Manuscripts: BM Add. 14,363a. f. 15r; BM Add. 14,365g. f. 13v.

45. Table of deflection (valana) (of the Moon) measured in digits for 0° to 90° of zenith distance. The maximum is 13;0 digits at 90°.

Manuscripts: BM Add. 14,363a. f. 15r; BM Add. 14,365g. f. 13v.

The *Jagadbhūṣaṇa* of Haridatta.

For this work, written in Śaka 1560 = A.D. 1638, see *SATIUS*, pp. 55b–59b.

The manuscripts of it described in this catalogue are:

*RAS Tod 59. 112ff. Copied in Saṃ. 17786 = A.D. 1729.
*RAS Tod 36e. 87ff. Copied in Saṃ 1820 = 1763.
*IO 252. 88 ff.

The Anonymous of 1638.

For this work see *SATIUS*, pp. 59b–60b. The manuscripts of it described in this catalogue are:

*BM Add. 26,448b. 5ff.

The *Pañcāṅgavidyādharī* of Vidyādhara.

For this work, written in Śaka 1565 = A.D. 1643, see *SATIUS*, pp. 60b–61b. The manuscripts of it described in this catalogue are:

*IO 2529b. 6ff. Copied in Saṃ. 1783, Śaka 1648 = A.D. 1726.

The *Grahaprakāśa* of Devadatta.

I. The Life of Devadatta.

Devadatta gives his genealogy in the first four verses of the *Grahaprakāśa*:

praṇamya nāgānanamantrapūrṇaṃ
gurum maṭāmbāṃ ravimukhyakheṭān /

sa<c>chiṣyabodhārtha<ma>haṃ prakurve
grahaprakāśaṃ sulaghuprakāram / 1 /

dhyātvā viśveśvaraṃ devaṃ tathā siddhivināyakam /
smṛtvā gurupadāmbhojaṃ tato labdhvāvabodhakam / 2 /

jāto 'ham agryeṇa <mano>rathena
yasyānukampāmṛtavṛṣṭipṛṣṭaḥ /

pāraṃgataś cākhiladarśanānāṃ
nāgeśabhaṭṭaṃ janakaṃ nato 'smi / 3 /

atha <g>u<ru>pravaṇenaiva sakaladevatāstavanasiddhir iti svaguruprasaṃsām savinayam āha–

ye[1] pādasaṃśīlanalabdhabodha
pra–v–śā tv[2] atimandabodhā /
ācāryavaryotkarakoṭibodhā
jātāś ca te 'smadguravo jayanti //4//

1. ms. yat. 2. ms. pra ... śā atha

Devadatta, then, was the son of Nāgeśābhaṭṭa, who is identical with the Nāgeśa, the son of Govinda of the Bhāradvājagotra and the grand-father of Murāri who wrote the *Laghutithidarpaṇa* in Śaka 1587 = A.D. 1665. Like his nephew, Murāri, Devadatta was a devotee of the goddess Maṭāmbā. In verse 5 Devadatta gives the epoch of the *Grahaprakāśa* as: vedāṣṭatithyūnitaśaka or Śaka 1584 = A.D. 1662. This date is used again in tables 10 to 18, where we find the following epoch positions (for avadhi 1) indicating as epoch date 28 March 1662.

	mean sidereal longitudes	true tropical longitudes	differences
Sun	5,57;51,39,51°	18	−20°
Moon	3,53;0,56,21	1,52	+22
Lunar apogee	48;-,17,16	*ca.* 4, 4	−11
Mars	2,14;16,-,10	1,52	+22
Mercury's anomaly	2,35;33,30,41	(Mercury) 29	
Jupiter	3,21;37,59,20	3,42	−20
Venus' anomaly	2,49;50,36,15	(Venus) 43	
Saturn	3,39;58,21,26	4, 5	−25
Lunar node	2,39;23,43,9	2,57	−18

On f. 4r of BM Add. 26,448e are two more verses giving additional information about Devadatta's genealogy:

bhāradvājakule 'sya vipratilakaḥ śrotre paro naiṣṭhiko
mantrajñaḥ śrutiśāstravic ca kuśalaḥ śrīkeśavo devavit /
tatputro bhiṣajajñavedanipuṇaḥ smārtaḥparo daivavid
govindākhyatadātmajo 'ticaturo nāgeśatatsūnunā //1//

śrīdevadattena kṛto hi samyak
siddhāntapakṣānugadṛṣṭigocaraḥ /
grahaprakāśo 'tilaghuprakāro
grāhyaḥ sudhībhiḥ pariśodhanīyaḥ //2

These verses (strongly reminiscent of Murāri's) inform us that Devadatta was the son of Nāgeśa, the son of Govinda, the son of Keśava of the Bhāradvājagotra.

Devadatta also wrote a commentary in 24 verses on the *Grahaprakāśa* which is found in BM Add. 26,448f. The colophon is: iti śrīmaddaivajñanāgeśatmajadevadatta- viracit < āyām > ātmīya-grahaprakāśaṭikāyāṃ candragrahaṇādhikāras tṛtīyaḥ samāptaḥ.

The parameters of the *Grahaprakāśa* indicate that it is based on the Adjusted Saurapakṣa.

II. Manuscripts:

BM Add. 26,448e. 11ff.
BORI 149 of A 1883, 84. 4ff.

III. Tables.

1.. Table of dhruvakas or yearly parameters:

Moon	2,12;46,40,48
Lunar anomaly	1,32;5,34,54
Mars	3,11;14, 4,19 (read 3,11;24,936)
Mercury's anomaly	54;35,22,48 (read 54;45,22,48)
Jupiter	30;21, 3,33 (read 30;21,3,36)
Venus' anomaly	3,45;11,48,21 (read 3,45;11,49,12)
Saturn	12;12,43,58 (read 12;12,54)
Lunar node	5,40;38,40,54 (6,0 – 19;21,19,6)
Lord of the year	1;15,31,31,24 days

Manuscripts: BM Add. 26,448e. f. 1v.

2. Table of mean daily motions expressed in minutes and seconds. Cf. tables 23 and 24.

Sun	59,8	Jupiter	5,0
Moon	790,35	Venus' conjunction	96,8
Lunar anomaly	783,54	Saturn ..	2,0
Mars	31,26	Lunar node	—3,11
Mercury's conjunction	245,32		

Manuscripts: BM Add. 26,448e. f. 1v.

3. Table of the week-days on which the Sun enters 1 to 12 zodiacal signs. This is table 31.

Aries	0; 2,18	Leo	6;32,22	Sagittarius	1;19,29
Taurus	2;59,19	Virgo	2;32,47	Capricorn	2;38,22
Gemini	6;25,19	Libra	4;58, 7	Aquarius	4; 5,32
Cancer	3; 3, 9	Scorpio	6;50,49	Pisces	5;56,29

Manuscripts: BM Add. 26,448e. f. 1v.

4. Table of elongations from the Sun necessary for the occurrence of the stations. Cf. tables 25 and 26.

	First station	Second station
Mars	164;35,40	196;30,25
Mercury	144;38,4	216;26,9
Jupiter	130;40,25	230;23,45
Venus	163;35,3	197;29,23
Saturn	115;42,51	245;21,11

Manuscripts: BM Add. 26,448e. f. 2v.

5. Table of elongations from the Sun necessary for the occurrences of heliacal risings and settings. Cf. tables 27 to 30.

	Risings		Settings	
	East	West	East	West
Mars	28;57,25			332;6,45
Mercury	205;27,59	50;53,45	310;10,25	155;35,20
Jupiter	14;59,45			346;4,25
Venus	183;31,43	24;48,14	336;6,13	177;32,43
Saturn	17;59,2			343;4,51

Manuscripts: BM Add. 26,448e. f. 2v.

6. Table of corrections to these elongations for each planet in each zodiacal sign.
Manuscripts: BM Add. 26,448e. ff. 2v–3r.

7. Table of weeks and week-days on which some phenomenon connected with the zodiacal signs occurs. In the following transcription I have added a column of differences expressed in days, which add up to 364 = 52 weeks.

	weeks	week-days	differences
Aries	51	2;27,59	25;58,15
Taurus	3	1; 7,35	26;39,36
Gemini	8	4;58,27	38;50,52
Cancer	12	1;24,57	24;26,30
Leo	17	5;47,24	39;22,27
Virgo	21	1;28,50	23;41,26
Libra	26	5;41,12	39;12,22
Scorpio	30	3;29,22	25;48,10
Sagittarius	34	1;47,26	25;18,4
Capricorn	38	0;24,27	27;37,1
Aquarius	43	6; 3,22	40;38,55
Pisces	47	4;29,44	26;26,22
			6,4; 0, 0
			days=52 weeks

Manuscripts: BM Add. 26,448e. f. 3v.

8. Table of week-days on which the Sun enters 1 to 28 nakṣatras.

Asvinī	0; 2,18	Svāti	4,39, 3
Bharaṇī	6;43,52	Viśākhā	3;59, 4
Kṛttika	6;32,18	Anurādha	3; 8, 5
Rohiṇī	6;26,53	Jyeṣṭhā	2;15, 6
Mṛgasiras	6;25,54	Mula	1;19,29
Ārdrā	6;26, -	Pūrvāṣāḍhā	0;22, 8
Punarvasu	6; -, -	Uttarāṣāḍhā	6;22, 9
Puṣya	6;34,-7	Abhijit ..	2;25,51
Asleṣā	6;34,58	Śravaṇa	5;28,15
Magha	6;32,29	Dhaniṣṭha	4;32,16
Purvaphālguni	6;21,52	Śatabhiṣak	3;42,17
Uttaraphālguni	6; 8, 0	Pūrvabhādrapadā	2;53,18
Hasta	5;46, 1	Uttarabhādrapada	2;13,19
Citra	5;14, 2	Revati	1;44,20

Manuscripts: BM Add. 26,448e. f. 4r.

9. Table of the equation of the center of the Moon in 3 columns. Column 1 gives the argument in 1 to 30 steps of 3 ; column 2 the equations, the maximum being 5;2,48 at 30 – 90 ; and column 3 the increment to (or decrease from) the mean daily motion, the maximum being 1;7,38 at 1 – 3°.
Manuscripts: BM Add. 26,448e. f. 4r.

10. Table of the mean motion of the Sun for 1 to 52 weeks in Śaka 1584 – A.D. 1662 3.
Manuscripts: BM Add. 26,448e. f. 4v.

11. Table of the mean motion of the Moon for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. ff. 5r–5v.

12. Table of the mean motion of the lunar anomaly for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. ff. 5r–5v.

13. Table of the mean motion of Mars for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. f. 6r.

14. Table of the mean motion of Mercury's anomaly for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. f. 6v.

15. Table of the mean motion of Jupiter for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. f. 7r.

16. Table of the mean motion of Venus' anomaly for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. f. 7v.

17. Table of the mean motion of Saturn for 1 to 52 weeks.
Manuscripts: BN Add. 26,448e. f. 8r.

18. Table of the mean mttion of the lunar node for 1 to 52 weeks.
Manuscripts: BM Add. 26,448e. f. 8v.

19. Table of the equations of the center for 0 to 15 steps of 6°. The maximum equations (those for Mercury and Jupiter are lost) are:

Sun	2;11°	Jupiter	(4;59° at 13 = 78°)
Moon	5; 3°	Venus	1;46°
Mars	11;32°	Saturn	7;39°
Mercury	(4;22° at 13 = 78°)		

Manuscripts: BM Add. 26,4488e. f. 9r.

20. Table of apogees.

Sun	Gemini	17;17, 1,38°	Jupiter	Virgo	21;21,27,31°
Mars	Leo	10; 2,27,50°	Venus	Gemini	19;51,45,22
Mercury	Scorpio	10;27,58,27°	Saturn	Scorpio (read Sagittarius)	26;37,31,47°

Manuscripts: BM Add. 26,448e. f. 9r.

21. Table of the equations of the conjunction for 0 to 30 steps of 6°. The maximum equations are:

Mars	40;16° at 22 = 132°	Venus	46;24° at 23 = 138
Mercury	21;32° at 19 = 114°	Saturn	6;22° at 16 = 96°
Jupiter	11;31° at 17 = 102°		

22. Table of the true longitude of the Sun for 1 to 52 weeks in 6 columns. Column 1 gives the argument as 1 to 52 weeks; column 2 its daily progress, with the maximum 1;1,26° at week 38, the minimum 0;56,50° at weeks 12 and 13; column 3 the traikya or sum of the equation of time and the half-equation of daylight, with the maximum being + 1;31 at week 11, the minimum —2;48 at week 41; column 4 the length of daylight, with the maximum being 34 ghaṭikās at week 12, the minimum 25;59 ghaṭikās at

week 38; and column 6 the traikya for Kāśī (Benares), wih the maximum being — 2;5 at weeks 11 and 12, the minimum - 2;18 at week 42.
Manuscripts: BM Add. 26,448e. ff. 10r–10v.

23. Table of mean motions for 1 to 7 days. The mean daily motions are precisely:

Sun	0;59, 8,10	Mercury's conjunction	4; 5,32,20
Moon	13;10,34,52	Jupiter	0; 4,59, 9
Lunar anomaly	13; 3,53,53	Venus' conjunction	1;36, 7,43
Mars	0;31,26,28	Saturn	0; 2, 0,22
Lunar node	—0; 3,10,45		

24. Table of mean daily motions expressed in minutes, seconds, and thirds; cf. tables 2 and 23.

Sun	5< 9>, 8,10	Jupiter	4,59, 9
Moon	<7>90,<34,52>	Venus' conjunction	96, 7,<43>
Lunar anomaly	783, 53,53	Saturn	2, 0,<22>
Mars	31, 26,28	Lunar node	3,10, 46
Mercury's conjunction	245, 32,20		

Manuscripts: BM Add 26,148e. f. 11v.

Tables 25 to 30 repeat the data of tables 4 and 5.

25. Table of elongations from the Sun for first station.
Manuscripts: BM Add. 26,448e. f. 11v.

26. Table of elongations from the Sun for second station.
Manuscripts: BM Add. 26,448e. f. 11v.

27. Table of elongations from the Sun for heliacal settings in the West.
Manuscripts: BM Add. 26,448e. f. 11v.

28. Table of elongations from the Sun for heliacal settings in the East.
Manuscripts: BM Add 26,448e. f. 11v.

29. Table of elongations from the Sun for heliacal risings in the West.
Manuscripts: BM Add 26,448e. f. 11v.

30. Table of elongations from the Sun for heliacal risings in the East.
Manuscripts: BM Add. 26,448e. f. 11v.

31. This is identical with table 3.
Manuscripts: BM Add. 26.448e. 11v.

The *Grahaprabodhasāriṇī* of Yādava.

For this work, composed in A.D. 1663, see *SATIUS*, pp. 63a–64b.

The manuscripts of it described in this catalogue are:

*BM Add. 14,365e. B pp. 1–11.
*IO 2083a. Ff. 5–37.

The *Tithidarpaṇa* Murāri.

I The Life of Murāri.

Murāri's genealogy is found in some verses on the additional folio of BM Add. 26,448d:

daivajñanārāyaṇanandanena vinirmite sā (?) tithidarpaṇe 'smin /
horāvidāṃ <sa> tsu camatkṛtārtham abdākhyabimbaṃ
paripūrt (ṇ) amāsīt //

bhāra<dvā>jakule 'sya vipratilakaḥ smārtaḥ paro daiva[jña]vid
govindākhyatadātmajo 'tinipuṇo mānyo nṛpaiḥ pūjitaḥ /
nāgeśo 'sya samudbhavo 'ticaturo daivajñanārāyaṇas
tatputreṇa murāriṇā viracitā (as) tithyādayo darpaṇaḥ //

Murāri, then, was the son of Nārāyaṇa, the son of Nāgeśa, the son of Govinda of the Bhāradvājagotra. Devadatta, the son of Nāgeśa and Murāri's uncle, wrote his *Grahaprakāśa* in Śaka 1584 = A.D. 1662. Govinda's father (Devadatta's great grand-father) was Keśava.

More information about Murāri is found in his *Laghutithidarpaṇa*:

ṣaṭpadmālayavāsinaṃ gaṇapatim vāṇīm maṭāmbāmbikāṃ
natvā śrīgurum ātmadehajanakaṃ nārāyaṇākhyaṃ tathā /

kurve 'haṃ tithidarpaṇaṃ laghutaraṃ puṇyodayārthaṃ sadā
bālānāṃ mativṛddhaye 'rthadam idaṃ śrīmān murāriḥ sudhīḥ 1 //

praviśya kāśyāṃ bhuvanasya nāthaṃ
    dṛṣṭvā tadoktāsitahṛṣṭacittaḥ
tatpūrvavṛttyāṃ maṇikarṇikāyāṃ
    snātvā murārir dhiyam āpa pūrvataḥ //2//

bhūdharāṣṭaśarabhūmite śake yātagamyaśaradaṅkayor adhaḥ
hīnayugā (ma?) ganakoṣṭakeṣv adhaḥ syuḥ sphuṭāḥ
    dhruvamukhā<s t>u kendrake //3//

Murāri, then the son and pupil of Nārāyaṇa, having gone to Kāśī (Benares) and bathed at Maṇikarṇikā in the eastern part of Kāśī, wrote the *Laghutithidarpaṇa* in Śaka 1587 = A.D. 1665.

II. Manuscripts:

*BM Add. 26,448d. 9ff

III. Tables.

1. Table of corrections for tithis for 0 to 29 steps of 12° of anomalistic motion of the Moon horizontal, and for 0 to 59 steps of 0;6° vertical. The table is formed so as to be always positive (as also are tables 2 and 3). The maximum correction is 50;17 ghaṭikās, the minimum 0;0, and the mean 25;8,30.
Manuscripts: BM Add. 26,448d. ff. 1r-3r.

2. Table of corrections for nakṣatras set up as in table 1. The maximum correction is 46;32 ghaṭikās, the minimum 0;0, and the mean 23;16.
Manuscripts: BM Add. 26,448d. ff. 3v-5v.

3. Table of corrections for yogas set up as in table. 1. The maximum correction is 42;54 ghaṭikās, the minmum 0;0, and the mean 21;27.
Manuscripts: BM Add. 26,448d. ff. 6r-8v.

4. Table of the lengths of shadows at various times of day entitled: chāyāṅgulair iṣṭaghaṭījñāna, i.e. "knowledge of desired ghaṭīs by means of the digits of the shadow." The horizontal argument is 1 to 13 and, in steps of ½, 13½ to 17 ghaṭīs; the vertical argument is 26° to 34° of terrestrial latitude.
Manuscripts: BM Add. 26,448d. additional folio, verso.

The *Laghutithidarpaṇa* of Murāri.

I. The *Laghutithidarpaṇa.*

The introductory verses of the *Laghutithidarpaṇa* have already been given above under the *Tithidarpaṇa*. It is clear that this work, in contrast to the former, is based on Makaranda's *Makaranda*. A subhāṣita on love is added by a later hand on f. 3v. of BH Add. 26,448h.

yad yātam āvayoḥ prema hemakalpadrumopamam /
smaraṇāmṛtaye keṇa (mṛta-sekena) varddhanīyaṃ punaḥ punaḥ //

II. Manuscripts:

*BM Add. 26,448h. 4ff.

III. Tables.

1. Table of tithis entitled: atha tithisāraṇī kāśyāṃ deśāntaraṃ varādikaṃ dhanaṃ 0/0/47; cf. BM Add. 26,448a. f. 1r. It is further stated that the epoch is Śaka 1587 = A.D. 1665, the epoch of the *Laghutithidarpaṇa*. The tithi table is in 4 columns. Column 1 gives the argument (entitled śaradaṅka) for 0 to 15 years and, in steps of 16, for 16 to 240 years; column 2 the tithidhruvaka (11 for single years, 27 for 16 years modulo 30); column 3 the week-day (6;6,12 for 16 years; the epoch value is 3;46,55 days); and column 4 the tithikendra (7;36,18 for single years, 2;45,8 for 16 years). Cf. tables 1 ad 2 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 1r.

2. Table of nakṣatras for 0 to 23 years and, in steps of 24, for 24 to 240 years, set up as is table 5. The nakṣatradhruva is 10 for single years, 23 for 24 years modulo 27; the week-day parameter is 2ffi12,35, with the epoch position being 3;4,34 days; and the nakṣatrakendra parameters are 7;43,14 for single years, 4;11,18 for 24 years, with the epoch position being 26;44,9 days. Cf. tables 5 and 6 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 1r.

3. Table of yogas for 0 to 23 years and, in steps of 24, for 24 to 240 years, set up as is table 5. The yogadhruva is 10 for

single years, 23 for 24 years modulo 27; the parameters for 24 years are the same as those for table 6, though entries for single years differ. The epoch position of the week-day is 3,7,40 days, that of the yogakendra 26;45,45. Cf. tables 9 and 10 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 1v.

4. Table of week-days on which the Sun enters Aries "at Kāśī (Benares)" for 0 to 23 years and, in steps of 24, for 24 to 240 years. The yearly parameter is 1;15,31,30 days, the epoch position (partially lost in the manuscript) is -;48,53 days. Cf. tables 13 and 14 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 1v.

5. Table for 1 to 26 pakṣas of week-days with negative cālakas and of tithikendras with positive calakas. Cf. table 3 of the *Makaranda*.
Manuscripts: BM 26,448h. f. 2r.

6. Table of corrections of the length of a tithi for 0 to 29 increases of 12 in anomalistic motion with divisors (hāras). The maximum correction is 49;54 ghaṭikās, the minimum 0;0, and the mean 24;57. Cf. table 4 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 2r.

7. Table for 1 to 15 sidereal months of week-days on which nakṣatras begin with positive cālakas. Cf. table 7 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 2v.

8. Table for 1 to 15 sidereal months of nakṣatrakendras with positive cālakas.
Manuscripts: BM Add. 26,448h. f. 2v.

9. Table of corrections of the length of nakṣatra for 0 to 29 with divisors (hāras). The maximum correction is 46,8 ghaṭikās, the minimum 0;0, and the mean 23;4. Cf. table 8 of the *Makaranda.*
Manuscripts: BM Add. 26,448h. f. 2v.

10. Table for 1 to 15 of the week-days on which yogas begin with negative calakas. Cf. table 11 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 3r.

11. Table for 1 to 15 of yogakendras with negative cālakas.
Manuscripts: BM Add. 26.448h. f. 3r.

12. Table of corrections of the length of a yoga for 0 to 29 with divisors (hāras). The maximum correction is 42;54 ghaṭikās, the minimum 0;0, and the mean 21;27. Cf. table 12 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 3r.

13. Table of week-days on which the Sun enters each of the 27 nakṣatras. This is table 16 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 3v.

14. Table of week-days on which the Sun enters each of the 12 zodiacal signs. This is table 15 of the *Makaranda*.
Manuscripts: BM Add. 26,448h. f. 3v.

The *Pañcāṅganayanasāraṇī*.

I. The *Pañcāṅganayanasāraṇī*.

The date of this work is given in the first verse as Śaka 1640 = A.D. 1718. The kṣepakas in table 14 indicate as epoch date Sunday 30 March 1718 Julian.

	kṣepakas	true tropical longitudes	differences
Sun	5,57;51,37,23°	19°	—21°
Moon	1,49; 3, 5,55	ca. 2,15	—26
Lunar apogee	4,59;46,19,36		
Mars	48;18,34,18	56	— 8
Mercury's conj.	5,41;51,44,25	(Mercury) 4	
Jupiter	1,41;17,17,12	1,54	—13
Venus' conj.	3, 0;51,20,24	(Venus) 19	
Saturn	3, 4; 0,43,54	3,30	—26
Lunar node	2,35;33,21,36	2,54	—19

II. Manuscripts:

*Oxford CS f. 51a. 8 ff.

III. Tables.

The following tables give the kṣepakas and the parameters for collected years (labdha) and single years (śeṣa) only. For the parameters, see the *Laghutithidarpaṇa* of Murāri.

1. Table of the tithivāra with the dhruva.

	dhruva	tithivāra
kṣepa	9	0; 3,57
labdha (16-year period)	27	6; 6,12
śeṣa	11	1;11,42

Manuscripts: Oxford CS f. 51a. f. 3r.

2. Table of the tithikendra.

kṣepa	13;49,8
labdha (16-year period)	2;45,8
śeṣa	7;36,18

Manuscripts: Oxford CS f. 51a. f. 3r.

3. Table of the nakṣatravāra with the dhruva.

	dhruva	nakṣatravāra
kṣepa	8	6;58,58
labdha (24-year period)	23	2;12,35
śeṣa	10	1;18,3

Manuscripts: Oxford CS f. 51a. f. 3r.

4. Table of the nakṣatrakendra.

kṣepa	13;42,53
labdha (24-year period)	4;11,36
śeṣa	7;43,14

Manuscripts: Oxford CS f. 51a. f. 3r.

5. Table of the yogavāra with the dhruva.

	dhruva	nakṣatravāra
kṣepa	8	0; 2,12
labdha (24-year period)	23	2;12,35
śeṣa	10	1;17,53

Manuscripts: Oxford CS f. 51a. f. 3r.

6. Table of the yogakendra.

kṣepa	13;43,36
labdha (24-year period)	4;11,18
śeṣa	7;43, 2

Manuscripts: Oxford CS f. 51a. f. 3r.

7. Table of the Lord of the year.

kṣepa	0;31,34,59,12
labdha (30-year period)	2;45,45,42, 0
śeṣa	1;15,31,31,24

Manuscripts: Oxford CS f. 51a. f. 3r.

8. Table of week-days on which the Sun enters each of the zodiacal signs.

Aries	0; 0, 0	Leo	6;29,53	Sagittarius	1;17, 8
Taurus	2;57, 2	Virgo	1;30,10	Capricorn	2,36, 2
Gemini	6;22,59	Libra	4;54,40	Aquarius	4; 3,28
Cancer	3; 1,46	Scorpio	6;48,20	Pisces	5;53,40

Manuscripts: Oxford CS f. 51a. f. 3r.

9. Table of tithivāras with negative cālakas and of tithikendras with positive cālakas for 0 to 13 synodic months. The motions in 13 synodic months are 5;53.16 and 27;57,27.
Manuscripts: Oxford CS f. 51a. f. 3v.

10. Table of nakṣatravāras with positive cālakas and of nakṣatrakendras with positive cālakas for 0 to 14 sidereal months. The motions in 14 sidereal months are 4;30,45 and 26;26,49.
Manuscripts: Oxford CS f. 51a. f. 4r.

11. Table of yogavāras with negative cālakas and of yogakendras wiith positive cālakas for 0 to 14. The motions in 14 are 5;52,31 and 27;27,59.
Manuscripts: Oxford CS f. 51a. f. 4v.

12. Table of week-days on which the Sun enters each of the nakṣatras.

Aśvinī	0; 0 0	Svāti	4;36,33
Bharaṇī	6;47,13	Viśākhā	3;53,59
Kṛttikā	6;28,10	Anurādhā	3; -, -
Rohiṇī	6;23,20	Jyeṣṭhā	2;13, 3
Mṛgaśiras	6;22,10	Mūla	1;17, 8
Ārdrā	6;24,40	Pūrvāṣāḍhā	0;18,56
Punarvasu	6;28,56	Uttarāṣāḍhā	6;20,30
Puṣya	6;33,13	Śravaṇa	5;23,15
Āśleṣā	6;33,17	Dhaniṣṭhā	4;28,52
Maghā	6;29,53	Śatabhiṣak	3;38,42
Pūrvaphālgunī	6;<19>,42	Pūrvabhādrapadā	2;53,24
Uttaraphālgunī	6; 5, 8	Uttarabhādrapadā	2;14, 6
Hasta	5;43,43	Revatī	1;41,29
Citrā	5;13, 2		

Manuscripts: Oxford CS f. 51a. f. 5r.

13. Table of corrections to lengths of tithis, nakṣatras, and yogas for 0 to 29 steps of 6°. The entries are identical with those in tables 6, 9, and 12 of the *Laghutithidarpaṇa*.
Manuscripts: Oxford CS f. 51a. f. 5v.

14. Table of mean motion parameters for 30-year periods and for single years with kṣepakas. These parameters are from the Adjusted Saurapakṣa.

	Labdhakas	Śeṣakas
Sun	0; 0, 0	0; 0, 0, 0°
Moon	23;20,24	2,12;46,40,48
Lunar apogee	2,20;31,29	40;41, 3,18
Mars	5,42, 4,48	3,11;24, 9,36
Mercury's conjunction	3,22;41,24	54,45;22,28
Jupiter	3,10;31,48	30;21, 3,36
Venus' conjunction	4,35;54,36	3,45;11,49,12
Saturn	6;27,36	12;12,54, 0
Lunar node	2,19;23, 6	5,40;38,43,13 (5,40;38,46,12)

Manuscripts: Oxford CS f. 51a. f. 6r.

15. Table of mean motion parameters for 1 week.

Sun	6;53,57,11°	Jupiter	0;34,51, 1°
Moon	1,32;14, 5, 0	Venus' conj.	11;12,54, 6
Lunar apogee	0;46,46,50	Saturn	0;14, 2,40
Mars	3;40, 5,17	Lunar node	−0;22,15,16
Mercury's conj.	28;38,46,25		

Manuscripts: Oxford CS f. 51a. f. 6r.

16. Table of mean motion parameters for 1 day.

Sun	0;59, 8,10,10°	Jupiter	0; 4,59, 8,48°
Moon	13;10,34,52, 4	Venus' conj.	1;36, 7,43,37
Lunar apogee	0; 6,40,59,31	Saturn	0; 2, 0,22,53
Mars	0;31,26,28,11	Lunar node	- 0; 3,10,44,55
Mercury's conj	4; 5,32,20,42		

These are the Saurapakṣa parameters shortened, not the parameters of the Adjusted Saurapakṣa.

Manuscripts: Oxford CS f. 51a. of. 6r.

17. Table of apogees.

Sun	Gemini	17;17,11°	Jupiter	Virgo	21;21,51°
Mars	Leo	10; 2,33	Venus	Gemini	19;51,59
Mercury	Scorpio	10;28, 8	Saturn	Scorpio	26;37,33

Manuscripts: Oxford CS f. 51a. f. 6v.

18. Table of the corrections for the longitudinal difference of Kāśī (Benares), Ayodhyā (Ayodhya), and Lakṣmaṇapura (Lucknow).

	Kāśī	Ayodhyā	Lakṣmaṇapura
Sun	0; 0,47	0; 0,47	0; 0,35
Moon	0;10,32	0; 8,44	0; 7,54
Lunar apogee	0; 0, 5	0; 0, 4	0; 0, 4
Mars	0; 0,25	0; 0,21	0; 0,19
Mercury's conj.	0; 3,16	0; 2,46	0; 2,27
Jupiter	0; 0,24	——	——
Venus' conj.	——	0; 1, 5	0; 0,58
Saturn	0; 0, 2	0; 0, 1	0; 0, 1
Lunar node	0; 0, 3	0; 0, 3	0; 0, 2

Manuscripts: Oxford CS f. 51a. f. 6v.

19. Table of elongations from the Sun required for the occurrence of the Greek-letter phenomena.

	Mars	Mercury	Jupiter	Venus	Saturn
First station	164°	144°	130°	167°	115°
Last station	196	216	230	193	145(245)
First visibility (east)	28	205	14	<18>3	17
Last visibility (west)	332	155	346	177	343
First visibility (west)		50		<24>	
Last visibility (east)		100(310)		336	

Save in the case of Saturn these are the parameters of the *Makaranda.*

Manuscripts: Oxford CS f. 51a. f. 6v.

20. Table of unknown import.

Aries	9	Pisces
Taurus	10	Aquarius
Gemini	11	Capricorn
Cancer	14	Sagittarius
Leo	16	Scorpio
Virgo	18	Libra
	—	
	78	

Manuscripts: Oxford CS f. 51a. f. 4r.

21. Table of equations of the center for 0 to 29 steps of 6°. The maximum equations at 15=90° are:

Sun	2;11°	Jupiter	5; 5
Moon	5;3	Venus	1;45
Mars	11;39	Saturn	7;39
Mercury	4;45		

Manuscripts: Oxford CS f. 51a. ff. 7r–7v.

22. Table of equations of the conjunction set up as in table 21. The maximum equations are:

Mars	40;16°	at 22 = 132°
Mercury	21;30	at 19 = 114
Jupiter	11;31	at 17 = 102
Venus	46;24	at 23 = 138
Saturn	6;21	at 16 = 96

Manuscripts: Oxford CS f. 51a. f. 8r.

The *Gaṇitarāja* of Kevalarāma Pañcānana.

I. The Life of Kevalarāma Pañcānana.

Kevalarāma's first work, the *Gaṇitarāja*, was written under Kṛṣṇacandra, who became king of Navadvīpa (Nadia, Bengal) in Kali 4829 = A.D. 1728: this date is used as epoch of the *Gaṇitarāja*, which follows the Adjusted Saurapakṣa. Verses 3 and 4 of this work are:

śrīkṛṣṇacandra dvijasārvabhaumo
bhūpālacakrārcitapādapadmaḥ /
kaler gatābde 'ṅkakarāṣṭavedair
mite navadvīpapatitvam āpa //3//

tato gatānāṃ śaradāṃ samuccitaṃ
kṛtvā navadvīpanṛpābdapiṇḍakam /
tatsūryasiddhāntamataṃ samāsataḥ
pañcānano vakti vicitrasaṅgraham //4//

The date indicated by the kṣepas in tables 24 to 29 is Saturday 30 March 1728 Julian.

	kṣepakas	true tropical longitudes	differences
Mars	2,42;20,23°	2,29°	+13°
Mercury's anom.	2,49;27, 0	(Mercury) 21	
Jupiter	44;47,55	1, 1	—16
Venus' anom.	4,32;50, 7	(Venus) 5,44	
Saturn	5, 6; 9,45	5,24	—18
Lunar node	5,22; 8,23	5,40	—18

In Śaka 1681 = A.D. 1739 Kevalarāma wrote a *Grahacarita* at Gauḍa (Gaur, Malda, Bengal) and in Śaka 1684 = A.D. 1762 *Grahacāra*. He is also known to have written a *Bhāgavatajyotiḥ-*

śāstrayor bhūgolakhagolavirodhaparihāra, a *Rekhāpradīpa*, a *Dṛkpakṣasāraṇī* and a *Tithisāraṇī* of which manuscripts are found in Gujarāt and Rājasthān; they probably were written when he was at the court of Mādhavasiṃha at Jaipur in the 1760's

II. Manuscripts:

Baroda 10078. 64ff. Copied in Śaka 1734 = A.D. 1812.

Paris BN 957 (Sanscrit Bengali 189) I (Guérin 28). Bengālī script. Copied in 1840. Incomplete.

*IO 983. 54ff. Bengālī script.

III. Tables.

1. Table of the duration of solar eclipses in ghaṭikās for 1 to 17 minutes in the radium of the Sun that are covered at mid-eclipse. The values are:

Minutes	Ghaṭikās	Minutes	Ghaṭikās	Minutes	Ghaṭikās
1	0;38	7	2;51	13	4;11
2	1;11	8	3;12	14	4;20
3	1;37	9	3;26	15	4;30
4	2; 2	10	3;38	16	4;39
5	2;22	11	3;50	17	4;45
6	2;40	12	4; 1		

Manuscripts: IO 983 f. 13bis r.

2. Table said to be of the krāntyaṃśāḥ ("degrees of declination") for 1 to 27 units (3;20°?) of the bhuja ("anomaly"), The fact that the maximum is identical in this table and in table 4 shows that the function tabulated here is the diameter (in digits) of the Sun.

1	3,54	10	29, 2	19	43,45
2	7,34	11	31, 2	20	45, 0
3	10,54	12	32,56	21	46,18
4	14, 4	13	34,42	22	47,22
5	17, 0	14	36,25	23	48,27
6	19,42	15	38, 2	24	49,32
7	22,15	16	39,34	25	50,34
8	24,38	17	41, 1	26	51,32
9	27, 0	18	42,25	27	52,30

Manuscripts: IO 983 f. 13bis r.

3. Table of the diameter of the Moon. The argument is the number of ghaṭikās required for the Moon to travel 13;20°.

55	53;0	61	47;30
56	52;0	62	47; 0
57	51;0	63	46; 0
58	50;30	64	45;30
59	49;30	65	44;30
60	48;30	66	44; 0

Manuscripts: IO 983 f. 13bis r.

4. Table of the diameter of the Sun for every 10 days of solar motion.

10	50, 0	100	49,30 (49,0)	190	51,30	280	52,30
20	49,30	110	49,30 (49,0)	200	52, 0	290	52,30
30	49,30	120	49,30	210	52, 0	300	52, 0
40	49,30	130	49,30	220	52,30	310	51,30
50	49, 0	140	49,30	230	52,30	320	51,30
60	49, 0	150	50, 0	240	52,30	330	51, 0
70	49, 0	160	50, 0	250	53, 0	340	51, 0
80	48,30	170	50,30	260	52,30	350	50,30
90	48,30	180	51, 0	270	52,30	360	50,30

Manuscripts: IO 983 f. 13bis r.

5. Table of an unidentified entity. The argument is from 1 to 105 unknown units.

1	0; 7	21	1;39	41	2;19
2	0;14	22	1;41	42	2;21
3	0;21	23	1;44	43	2;23
4	0;28	24	1;47	44	2;25
5	0;34	25	1;49	45	2;26
6	0;40	26	1;52	46	2;27
7	0;45	27	1;54	47	2;28
8	0;50	28	1;56	48	2;28
9	0;55	29	1;58	49	2;29
10	1; 0	30	2; 0	50	2;30
11	1; 4	31	2; 2	51	2;31
12	1; 8	32	2; 4	52	2;32
13	1;12	33	2; 6	53	2;33
14	1;16	34	2; 7	54	2;34
15	1;20	35	2; 8	55	2;35
16	1;23	36	2;10	56	2;36
17	1;27	37	2;11	57	2;37
18	1;30	38	2;13	58	2;38
19	1;33	39	2;15	59	2;39
20	1;36	40	2;17	60	2;40

61	2;41	76	2;52	91	3; 0
62	2;42	77	2;53	92	3; 1
63	2;43	78	2;53	93	3; 1
64	2;44	79	2;54	94	3; 2
65	2;44	80	2;54	95	3; 2
66	2;45	81	2;55	96	3; 3
67	2;46	82	2;55	97	3; 4
68	2;47	83	2;56	98	3; 4
69	2;48	84	2;56	99	3; 5
70	2;48	85	2;57	100	3; 5
71	2;49	86	2;57	101	3; 6
72	2;50	87	2;58	102	3; 6
73	2;50	88	2;58	103	3; 7
74	2;51	89	2;59	104	3; 7
75	2;52	90	3; 0	105	3; 7

Manuscripts: IO 983 f. 13bis r.

6. Table of the lengths of time required for the Moon to traverse one nakṣatra or 13;20°. The first column gives the lunar anomaly from perigee in intervals of 13;30°, the second the lengths of the nakṣatras in daṇḍas (= ghaṭikās), and the third an unidentified quantity.

13;30	55	185;42
27; 0	56	182;77
40;30	57	179;21
54; 0	58	176; 9
67;30	59	172;57
81; 0	60	169;45
94;30	61	167;10
108; 0	62	164;30
121;30	63	161;50
135; 0	64	159;10
148;30	65	156;30
162; 0	66	153;50
175; 0 (175;30)		
189; 0		

Manuscripts: IO 983 f. 13bis v.

7. Table of the half-durations of lunar eclipses measured in ghaṭikās. The argument increases from 1 to 180; the entry for 180 is 4;36 ghaṭikās.
Manuscripts: IO 983 f. 13bis v.

8. Table of the Lord of the year 1 to 10 years, and for 0 to 100 years in steps of 10. The yearly parameter is 1;15.31.31,24 days, the epoch position 6;9,25,0 days.
Manuscripts: IO 983 f. 14r.

9. Table of the motions of the tithidhruva, tithivāra, and tithikendra for 1 to 31 years and for 0 to 62 years in steps of 31. The yearly parameters and epoch positions are:

	yearly parameter	epoch position
tithidhruva	11	0
tithivāra	1;11,41,43	6;27,27,0
tithikendra	7;36,18,15	0;54,51,0

Manuscripts: IO 983 ff. 14r–14v.

10. Table of the motions of the nakṣatradhruva, nakṣatravāra and nakṣatrakendra for 1 to 24 years and for 0 to 48 years in steps of 24. The yearly parameters and epoch positions are:

	yearly parameters	epoch positions
nakṣatradhruva	10	26
nakṣatravāra	1;18, 3	5;25,25
nakṣatrakendra	7;43,14	29;47,29

Manuscripts: IO 983 f. 14v–15r.

11. Table of the motions of the yogadhruva, yogavāra, and and yogakendra for 1 to 24 years and for 0 to 72 years in steps of 24. The yearly parameters and epoch positions are:

	yearly parameters	epoch positions
yogadhruva	10	26
yogavāra	1;17,53	5;28,30
yogakendra	7;43, 2	29;51,28

Manuscripts: IO 983 ff. 15r–15v.

12. Table of corrections to tithis for 0 to 29 units of 12° increase in lunar anomaly horizontal, and for 1 to 59 units of 0;6°. The maximum correction is 24;50 ghaṭikās.

Manuscripts: IO 183 ff. 15v–17v.

13. Table of 4 functions (unidentified) for the following days in a year: dyu (= 0), 14, 29, 44, <59>, 74, 88, (103), 117, 132, 147, 161, 176, 191, 206, 221, 236, 250, 265, 280; 295; 310; <325>, 339, and 354 — thus for every syzygy. The 4 functions have the following maxima and minima (the day-numbers are in parentheses):

	maxima	minima
1	1; 0,59,14 (250-280)	1;0,58,51 (172)
2	2; 4.29 (250-265)	2;4, 6 (59)
3	15; 6,35,32 (172)	0;0, 0, 0 (0)
4	28;37,45 (191)	0;0, 0 (0)

Manuscripts: IO 983 ff. 18r–19r.

14. Table of corrections to nakṣatras set up as is table 12, save that the argument is in degrees of sidereal longitude. The maximum correction is 23;0 ghaṭikās.
Manuscripts: IO 983 ff. 19r–21v.

15. Table of 4 functions (unidentified) for the following days in a year: 0, 15, 30, 45, 60, 76, 91, 106, 121, 136, 151, 166, 181, 196, 211, 226, 242, 257, 273, 228, (288), 303, 318, 333, 348, and 363. The 4 functions have the following maxima and minima:

	maxima	minima
1	1;1,0,45 (333-363)	1;1,0.41 (121-226)
2	1;6,7 (30)	1;6,5 (242-257 and 303)
3	24;4,49,53 (242)	0;0,3,0 (0)
4	28;44,35 (136)	0;0,2 (0)

Manuscripts: IO 983 ff. 21v–22v.

16. Table of corrections to yogas set up as is table 12, save that the argument is in degrees of elongation from the Sun. The maximum correction is 21;22 ghaṭikās.
Manuscripts: IO 983 ff. 22v–24v.

17. Table of 4 functions (unidentified) for the following calendar dates using solar months (the differences are given in parentheses): 0, 13 Vaiśākha (13), 28 Vaiśākha (15), 10 Jyeṣṭha (13), 25 Jyeṣṭha (15), 7 Āṣāḍha (14), 22 Āṣāḍha (15), 4 Śrāvaṇa (13), 19 Śrāvaṇa (15), 2 Bhādra (14), 15 Bhādra (13), 29 Bhādra (14), 13 Āśvina (15), 26 Āśvina (13), 11 Kārttika (15), 24 Kārttika (13), 9 Āgrahārana (15), 23 Āgrahārana (14), 8 Pauṣa (15), 22 Pauṣa (14), 9 (7) Māgha (14), 20 Māgha (13), 5 Phālguna (15), 19 Phālguna (14), 4 Caitra (15), and 18 Caitra (14). The 4 functions have the following maxima and minima:

	maxima	minima
1	1;0,56,38 (10 Jyeṣṭha—22 Āṣāḍha)	1;0,56,20 (9 Āgrahārana—22 Pauṣa)
2	1;1,40 (7 Āṣāḍha—22 Āṣāḍha)	1;1,20 (9 Āgrahārana—8 Pauṣa)
3	24;3,3,2 (18 Caitra)	0;0,0,0, (0)
4	24;23,2 (18 Caitra)	0;0,0,0 (0)

Manuscripts: IO 983 ff. 24v–25v.

18. Table of week-days on which the Sun enters each of the 27 nakṣatras. The entries are close to, but not identical with, those in tables 16 and 16c of the *Makaranda*.
Manuscripts: IO 983 f. 25v.

19. Table of the days in the year on which each of the 12 solar months ends.

Vaiśākha	31	Bhādra	156	Pauṣa	275
Jyeṣṭha	63	Āśvina	187 (186)	Māgha	305
Āṣāḍha	94	Kārttika	216	Phālguna	335
Śrāvaṇa	125	Āgrahārana	246	Caitra	365

Manuscripts: IO 983 f. 26r.

20. Table of the mean motion of the lunar node for 1 to 10 years and for 0 to 40 years in steps of 10. The yearly mean motion is –19;21,34°; the epoch position –39;51,10°. Cf. table 29.
Manuscripts: IO 983 f. 26r.

21. Table of the true longitude of the Sun for 1 to 366 days.
Manuscripts: IO 983 ff. 26r–28r.

22. Table of the mean motion of the Sun for 1 to 60 ghaṭikās. The daily mean motion is 0;59,8°.
Manuscripts: IO 983 f. 28r.

23. Table of the mean longitude of the Sun for 1 to 366 days. In 365 days it travels 5,59;44,44°
Manuscripts: IO 983 ff. 28r–30r.

24. Table of the mean motion of Mars for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is 3,11;24,9,36°; the epoch longitude 2,42;20,23°.
Manuscripts: IO 983 f. 30r.

25. Table of the mean motion of Mercury's conjunction for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is 54;45,22,48°; the epoch longitude 2,49;27,0°.
Manuscripts: IO 983 f. 30r.

26. Table of the mean motion of Jupiter for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is 30;21,3,36°; the epoch longitude 44;47,55°.
Manuscripts: IO 983 f. 30r.

27. Table of the mean motion of Venus' conjunction for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is 3,45;11,49,12 ; the epoch longitude 4;32,50,7°.
Manuscripts: IO 983 f. 30v.

28. Table of the mean motion of Saturn for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is 12;12,54° ; the epoch longitude 5,6;9,45°.
Manuscripts: IO 983 f. 30v.

29. Table of the mean motion of the lunar node for 1 to 10 years and for 0 to 70 years in steps of 10. The yearly mean motion is −19;21,11,24°; the epoch longitude −37;51,37°. Cf. table 20.
Manuscripts: IO 983 f. 30v.

30. Table of the mean motion of Mars for 1 to 366 days; the motion in 365 days is 3,11;47,27°.
Manuscripts: IO 983 ff. 31r–32v.

31. Table of the mean motion of Mercury's conjunction for 1 to 366 days; the motion for 366 days is 57; 46,35°.
Manuscripts: IO 983 ff. 32v–33bis r.

32. Table of the mean motion of Jupiter for 1 to 366 days; the motion for 366 days is 30; 24,50°.
Manuscripts: IO 983 ff. 33bis v–34v.

33. Table of the mean motion of Venus' conjunction for 1 to 366 days; the motion for 366 days is 3,46;23,12°.
Manuscripts: IO 983 ff. 34v–36r.

34. Table of the mean motion of Saturn for 1 to 366 days; the motion for 366 days is 12;14,23°.
Manuscripts: IO 983 ff. 36r–37v.

35. Table of the mean motion of the lunar node for 1 to 366 days; the motion for 366 days is −19;23,50°.
Manuscripts: IO 983 ff. 37v–38v.

36. Table of elongations from the Sun necessary for the first and last visibilities of the planets in the several zodiacal signs.

	♈ ♓	♉ ♒	♊ ♑	♋ ♌ ♏ ♐	♍ ♎
Mars	22;29	19;50	16;40	15; 0	15;30
Mercury śī	18;34	19;20	13;45	12;21	12;43
vaṃ	15;51	14; 0	11;45	10;36	10;56
Jupiter	14;32	12;53	10;47	9;42	9; 7
Venus śī	13;13	11;40	9;48	8;49	9; 7
vaṃ	10;35	9;20	7;51	7; 4	7;12
Saturn	19;50	17;30	14;42	13;15	13;41

Manuscripts: IO 983 f. 38v.

The tables of planetary equations are arranged in the following way. The first table for each planet gives halves of the equation of the conjunction, the second the equation of the center, and the third the equation of the conjunction. In all cases the equation is normed so as to be always positive by adding to each entry the maximum and a constant. The tables are for 0 to 11 zodiacal signs horizontal and for 1 to 30° vertical.

37. Table of half the equation of the conjunction of Mars. The constant is 0;49° at 128° to 132°, the maximum 41;5° at 228° to 241°, and the maximum half equation 20;8°.
Manuscripts: IO 983 ff. 39r–39v.

38. Table of the equation of the center of Mars. The constant is 29;28° at 245° to 249°, the maximum 52;32° at 63° to 67°, the maximum equation 11;32°; the apogee is at Leo 19°.
Manuscripts: IO 983 ff. 39v–40v.

39. Table of the equation of the conjunction of Mars. The constant is 0;42° at 268, the maximum 81;18° at 172°, the maximum equation 40;16°.
Manuscripts: IO 983 ff. 40v–41v.

40. Table of half the equation of the conjunction of Mercury. The constant is 8;45° at 110°, the maximum 30;16° at 249° to 250°, the maximum half-equation 10;45,30°.
Manuscripts: IO 983 ff. 41v–42r.

41. Table of the equation of the center of Mercury. The constant is 17;32° at 332° to 330°, the maximum 26;28° at 146° to 148°, the maximum equation 4;28°; the apogee is at Scorpio 29°.
Manuscripts: IO 983 ff. 42r–43r.

42. Table of the equation of the conjunction of Mercury The constant is 0;29° at 273°, the maximum 43;31° at 131°, the maximum equation 21;31°.
Manuscripts: IO 983 ff. 43r–44r.

43. Table of half the equation of the conjunction of Jupiter. The constant is 2;52° at 100°, the maximum 14;24° at 250° to 251°, the maximum half-equation 5;46°.
Manuscripts: IO 983 ff. 44r–44v.

44. Table of the equation of the center of Jupiter. The constant is 6;54° at 271° to 274°, the maximum 17;6° at 86° to 89°, the maximum equation 5;6°; the apogee is at Virgo 13°.
Manuscripts: IO 983 ff. 44v–45v.

45. Table of the equation of the conjunction of Jupiter. The constant is 0;28° at 272°, the maximum 23;32° at 102°, the maximum equation 11;32°.
Manuscripts: IO 983 ff. 45v–46v.

46. Table of half the equation of the conjunction of Venus. The constant is 0;58° (read 0;51°) at 140°, the maximum 47;15° at 220° to 221°, the maximum half-equation 23;8,30°; the argument begins at 0°.
Manuscripts: IO 983 ff. 46v–47v.

47. Table of the equation of the center of Venus. The constant is 48;15° at 184° to 202°, the maximum 51;45° at 6° to 22°, the maximum equation 1;45°; the apogee is at Cancer 5°.
Manuscripts: IO 983 ff. 47v–48v.

48. Table of the equation of the conjunction of Venus. The constant is 3;36° at 272° to 274°, the maximum 96;24° at 186° to 188°, the maximum equation 46,24°.
Manuscripts: IO 983 ff. 48v–49v.

49. Table of half the equation of the conjuction of Saturn. The constant is 0;12° (read 0;10°) at 94° to 99°, the maximum 6;32° at 267 to 271°, the maximum half-equation 3;11°.
Manuscripts: IO 983 ff. 49v–50v.

50. Table of the equation of the center of Saturn. The constant is 0;20° at 334° to 335°, the maximum 15;40° at 144° to 145°, the maximum equation 7;40°; the apogee is at Scorpio 29°.
Manuscripts: IO 983 ff. 50v–51v.

51. Table of the equation of the conjunction of Saturn. The constant is 1;38 at 270° to 276°, the maximum 14;22 at 100° to 116°, the maximum equation 6;22°.
Manuscripts: IO 983 ff. 51v–52v.

The *Grahāgama* of Govindasūnu.

I. The Life of Govindasūnu.

The son of Govinda (who does not give his name) speaks very obscurely in his first verse:

sāmbaṃ ca lakṣmīpatiṣaṣṭharūpanāmāgrajas tatpararūpanāma
strīṇām apūrvo grahadaṃ karoti govindanāmātmaja eva natvā ||

The second verse commences; pañcāṅkabhūponaśako—i.e., Śaka 1695=A.D. 1773. The date is confirmed by the kṣepas in table 1. It is possible that the father, Govinda, is the astrologer of that name who wrote a *Ramalārkaprakāśa* at Virāṭa (Bairat, Jaipur, Rājasthān) in Saṃ. 1800 = A.D. 1743. In the colophons of the *Grahāgama* one reads: govindasūnunā cokte grahāgame manohare śiposī iti saṃsthe. I have not been able to identify Śiposī. Govindasūnu, as will appear, follows the Gaṇeśapakṣa.

II. Manuscripts:

*BM Add. 14,363d. 1f.

*BM Add. 14,365b. A p. 1 and B pp. 1–2.

III. Tables.

1–9. Tables of the mean motions of the planets for 1 day, 30 days, and 360 days; the longitudes of the apogees (where appropriate); and the mean motions for dhruvāṅkas (periods of 4,016 days) 0 to 7. The entries for dhruvāṅka 0 are the epoch positions; they yield the date 6 February 1773 Julian (23 dhruvāṅkas after the epoch of the *Grahalāghava*).

	mean sidereal longitude	true tropical longitude	difference
Saturn	2,14;15°	2,42°	—28°
Jupiter	5,27;22	5,40	—13
Mars	1,49;52	1,53	— 3
Sun	5, 7;49,47	5,28	—20
Venus' anom.	4,57;33	(Venus) 5, 0	
Mercury's anom.	5,10;12	(Mercury) 5, 8	
Moon	4,22;23,47	*ca.* 4,38	—16
Lunar apogee	14;18		
Lunar node	—2,52;28	—2,47	— 5

The mean daily motions are those of the Gaṇeśapakṣa (the differences are due to the fact that the motions for 360 days are given only to three sexagesimal places).

	mean daily motions	longitudes of apogees
Saturn	0; 2, 0,23, 4,30	240°
Jupiter	0; 4,59, 8,34,20	180
Mars	0;31,26,31, 3,30	120
Sun	0;59, 8,10,17, 0	78
Venus' anomaly	1;36,59,40, 0,40	90
Mercury's anomaly	3; 6,24, 8, 6,50	210
Moon	13;10,34,51,55,50	
Lunar apogee	0; 6,40,51,25,40	
Lunar node	0; 3,10,48,25,10	

Manuscripts: BM Add. 14,365b. B p. 1.

10–14. Tables of the manda equations of the planets, each in 3 columns. Column 1 gives the argument for 0 to 6 units of 15°, column 2 the corresponding equations, and column 3 the gatis. The equations are those of the Gaṇeśapakṣa.

	maximum equations
Saturn	9;18°
Jupiter	5;42
Mars	13;0
Venus	1;30
Mercury	3;36

Manuscripts: BM 14,365b. B p. 2.

15–19. Tables of the śīghra equations of the planets set up as are tables 10–14, but with the argument being for 0 to 12 units of 15°. The equations are those of the Gaṇeśapakṣa.

	maximum equations
Saturn	5;42° at 6 (90°) and 7 (105°)
Jupiter	10;48 at 7 (105°)
Mars	40; 0 at 9 (135°)
Venus	46; 6 at 9 (135°)
Mercury	21;12 at 7 (105°) and 8 (120°)

Manuscripts: BM Add. 14,365b. B p. 2.

The *Patraprakāśa* of Viśrāmaśukla.

I. The Life of Viśrāmaśukla.

Though Eggeling assumes that Balabhadra who copied the manuscript IO 2631 in 1783 is the author of these tables, there is no supporting evidence. The date is rather indicated by the fact that below each of the tables of the longitudes of the planets (tables 22 to 26) is noted the date: saṃvat 1834 = A.D. 1777; and the name of the author is indicated by a verse on f. 1v:

praṇamyaikadantaṃ guroḥ pādapadmaṃ
ca kurve sutithyādipatraprakāśaṃ
satāṃ prītaye svalpabuddhiprabodhaṃ
mahāścaryabhūtaṃ hi viśrāmaśuklaḥ .

The colophon at the end of the work—iti śrīsūryasiddhāntamate śrīpatrapragāśa (sic!) samāpta—informs us that Viśrāmaśukla followed the (Adjusted) Saurapakṣa. Above several of the tables is given the deśāntara for Kāśī: + 47 palas. Viśrāmaśukla, then, probably wrote in Benares.

II. Manuscripts:

*IO 2631. 84ff. Copied in Śaka 1704, Saṃ. 1839 = A.D. 1783.

III. Tables.

1. Table of tithis, week-days, and tithikendras for Śaka 1672 to 1736 = A.D. 1750 to 1814 in intervals of 16 years. The parameters for the tithis and week-days are identical with those in table 1 of the *Makaranda*; the parameter for the tithikendra is 2;45,8,30 tithis every 16 years, or 7;40,19;16;52;30 tithis a year.
Manuscripts: IO 2631 f. 1v.

2. Table of tithis, week-days, and tithikendras for 1 to 16 years. The entries for tithis are identical with those in table 2 of the *Makaranda*; that for the tithikendra is 7;36,17.54 tithis for years 1 to 15, 8;40,40,0 tithis for year 16.
Manuscripts: IO 2631 f. 1v.

3. Table of week-days and tithikendras with their calakas for 0 to 24 pakṣas. The entries for the week-days are identical with those in table 3 of the *Makaranda*; the parameter for the tithikendra for 1 pakṣa is 16;4,31,55 tithis.
Manuscripts: IO 2631 f. 1v.

4. Table of corrections of the tithi, for 0 to 29 thirtieths of an anomalistic month horizontal, 0 to 59 sixtieths of these vertical. The maximum correction is 24:17 as in table 4 of the *Makaranda*.
Manuscripts: IO 2631 ff. 2r–4r.

5. Table of nakṣatras, week-days, and nakṣatrakendras for Śaka 1680 to 1752 = A.D. 1758 to 1830 in intervals of 24 years. The parameter for the nakṣatras is identical with that in table 5 of the *Makaranda*. The parameter for the week-days is 2;12,34,36 days or 1;15,31,26,30 days a year. The parameter for the nakṣatrakendra is 4;11,18,16 tithis for every 24 years, or 7;40,28,15,40 tithis a year.
Manuscripts: IO 2631 f. 4v.

6. Table of nakṣatras, week-days, and nakṣatrakendra for 1 to 24 years. The parameter for the nakṣatras is IO nakṣatras for years 1 to 23, 9 nakṣatras for year 24. The parameter for the week-days is 1;18,3,12 days for years 1 to 23, 0;17,21,0 days for year 24. Cf. table 6 of the *Makaranda*. The parameter for the nakṣatrakendra is 7;43,13,32 tithis for years 1 to 23, 6;39,7,0 (read 6;37,7,0) tithis for year 24. Note that (1;18,3,12 × 23) + 0;17,21 = 2;12,34,36 modulo 7; and that (7;43,13,32 × 23) + 6;37,7 = 4;11,18,16 modulo 30.
Manuscripts: IO 2631 f. 4v.

7. Table of week-days and nakṣatrakendras with their cālakas for 0 to 13 sidereal months. The entries for the week-days are virtually identical with those in table 7 of the *Makaranda*; the mean parameter for the nakṣatrakendra is approximately 29;44,45.
Manuscripts: IO 2631 f. 4v.

8. Table of corrections of the nakṣatrakendra for 0 to 29 thirtieths of a sidereal month horizontal, 0 to 59 sixtieths of these vertical. The maximum correction is 23;4 as in table 8 of the *Makaranda*.
Manuscripts: IO 2631 ff. 5r–7r.

9. Table of yogas, week-days, and yogakendras for Śaka 1680 to 1728 = A.D. 1758 to 1806 in intervals of 24 years. The parameter for the yoga is identical with that in table of the *Makaranda*. The parameter for the week-days is 2;12,34,20 days or 1;15,31,25,50 days a year. The parameter for the yogakendra

is 4;11,18,16 (cf. table 5) or 4;11,18.26; it should be 4;11,18,46 to agree with table 10, or 7;40,28,16,55 tithis a year.
Manuscripts: IO 2631 f. 7v.

10. Table of yogas, week-days, and yogakendras for 1 to 24 years. The parameter for the yogas is 10 yogas 1 to 23, 9 yogas for year 24. The parameter for the week-days is 1;17,52,40 days for years 1 to 23, 0;21,23,0 days for year 24. The parameter for the yogakendra is 7;43,2 2 tithis for years 1 to 23, 6;41,32.0 tithis for year 24. Note that (1;17,52,40 × 23) + 0;21 23 = 2;12,34,20 modulo 7; and that 7;32.2,2 × 23) + 6;41, 32 = 4;11,18,46 modulo 30. Cf. table 10 of the *Makaranda*.
Manuscripts: IO 2631 f. 7v.

11. Table of week-days and yogakendras with their cālakas for 0 to 14 yoga-months (a yoga-month is the time it takes for the combined increases in longitude of the Sun and Moon to equal 360°) The mean parameter for the week-day is approximately 4;55.10,47.8 days modulo 7. The mean parameter for the yogakendra is approximately 27;40,31,42,51. Cf. table 11 of the *Makaranda.*
Manuscripts: IO 2631 f. 7v.

12. Table of corrections of the yogakendra for 0 to 29 thirtieths of a yoga-month horizontal 0 to 59 sixtieths of these vertical. The maximum correction is 21;27 as in table 12 of the *Makaranda.*
Manuscripts: IO 2631 ff. 8r–10r.

13. Table of week-days on which the Sun enters Aries for Śaka 1688 to 1776 = A.D. 1766 to 1854 in intervals of 44 years. Cf. table 13 of the *Makaranda.*
Manuscripts: IO 2631 f. 10v.

14. Table of week-days on which the Sun enters Aries for 1 to 44 years. The parameter is 1;15,31,30 days. This is table 14 of the *Makaranda.*
Manuscripts: IO 2631 f. 10v.

15. Table of week-days on which the Sun enters each of the 28 naksatras. This is table 16 of the *Makaranda*, save that an entry is made for Abhijit 2;10,35 after Uttarāsādhā.
Manuscripts: IO 2631 f. 10v.

16. Table of week-days on which the Sun enters each zodiacal sign. This is table 15 of the *Makaranda*.
Manuscripts: IO 2631 f. 10v.

17. Unexplained table whose argument is Aries to Pisces horizontal and the same vertical; the horizontal argument represents the ascending node, the vertical argument the Sun. The maximum entry is 107 when the node is in Capricorn and the Sun in Virgo, the minimum 42 when the node is in Libra and the Sun in Sagittarius.
Manuscripts: IO 2631 f. 11r.

18. Table of mean of Mars, Mercury's anomaly, Jupiter, Venus' anomaly, Saturn, and the lunar node for Śaka 1672 to 1832 = A.D. 1750 to 1910 in intervals of 40 years; the entries for the planets are in terms of tables 22 to 26, and so must be multiplied by 6° to give mean longitudes in degrees.
Manuscripts: IO 2631 f. 12r.

19. Table of mean motions of the same entities for 1 to 40 years. The yearly mean motions are.

	entries	mean motions
Mars	31;54, 1,36 (× 6°)	3,11;24, 9,36°
Mercury's anom.	9; 7,33,48	54;45,22,48
Jupiter	5; 3,30,36	30;21, 3,36
Venus' anom.	37;31,58,12	3,45;11,49,12
Saturn	2; 2, 9, 0	12;12,54, 0
Lunar node	5,40;38,46,12° (−6,0°)	−19;21,13,48

Manuscripts: IO 2631 ff. 12r–12v.

20. Table of the longitudes of the Sun for 1 to 52 weeks; the entry for week 52 (= 357 days) is 5,51;53,45°. Also recorded are the Sun's daily progress for each week (the maximum is 1;2,26° at weeks 38–39, the minimum 0;56,50° at week 13); the traikya or equation of time (the maximum is +2;5 ghaṭikās at weeks 11–12, the minimum −2;18 ghaṭikās at week 42); and the length of daylight (the maximum is 34;17 ghaṭikās at week 12, the minimum 25;47 ghaṭikās at week 38).
Manuscripts: IO 2631 f. 13r.

21. Table of the longitude of the ascending node for 1 to 52 weeks. The entry for week 52 (= 357 days) is −18;54,57°.
Manuscripts: IO 2631 f. 13v.

22. Table of the true longitudes of Mars for 1 to 52 weeks horizontal, 0 to 59 years vertical. The mean longitudes of Mars increase by 6° for each year; that for week 1 of year is 0°. So also for the other planets.
Manuscripts: IO 2631 ff. 14r–25v.

23. Table of the true longitudes of Mercury for 1 to 52 weeks horizontal, 0 to 59 years vertical.
Manuscripts: IO 2631 ff. 26r–37v.

24. Table of the longitudes of Jupiter for 1 to 52 weeks horizontal, 0 to 59 years vertical.
Manuscripts: IO 2631 ff. 38r–49v.

25. Table of the true longitudes of Venus for 1 to 52 weeks horizontal, 0 to 59 years vertical.
Manuscripts: IO 2631 ff. 50r–61v.

26. Table of the true longitudes of Saturn for 1 to 52 weeks horizontal, 0 to 59 years vertical.
Manuscripts: IO 2631 ff. 62r–73v.

27. Table of the first and last visibilities and the stationary points of Mars for 0 to 59 years. noted in the table are the week-number, the phenomenon recorded, the days within the week, and the difference to the recurrence of the same phenomenon in the next year. Tables 29 to 32 are set up in the same way.
Manuscripts: IO 2631 ff. 74r–74v.

28. Table of the beginnings of the nakṣatracaraṇas.
Manuscripts: IO 2631 f. 74v.

29. Table of the first and last visibilities and the stationary points of Mercury; set up as is table 27.
Manuscripts: IO 2631 ff. 75r–80v.

30. Table of the first and last visibilities and the stationary points of Jupiter; set up as is table 27.
Mauscripts: IO 2631 ff. 81r–81v.

31. Table of the first and last visibilities and the stationary points of Venus; set up as is table 27.
Manuscripts: IO 2631 ff. 82r–82v.

32. Table of the first and last visibilities and the stationary points of Saturn; set up as is table 27.
Manuscripts: IO 2631 ff. 83r–84r.

<Khaṇḍakhādyakasāriṇī>

I. The *<khaṇḍakhādyakasāriṇī>*.

Of this untitled set of astronomical tables only a very imperfect copy is available. This, being written in Śāradā script, evidently originated in Kāśmīra, one of the places (with Assam and Nepal) where the *Khaṇḍakhādyaka*, written by Brahmagupta at Bhillamāla (Bhinmal, Rajasthan) in 665, maintained its popularity. The mean motion tables of this work are now lost, as are the tables of the equations of the Sun, the Moon, Mars, Mercury, Jupiter, and the beginning of Venus.

II. Manuscripts.

IO 3653c. 46ff.

III. Tables.

1. Table of the equation of the conjunction of Venus. There are 3 columns. The first gives the argument for 1° to 180°, the second the equation, and the third the increment to or decrease from the daily progress. The maximum equation was 46;15°; the closest value surviving in our manuscript is 46;12,–° at 135°.
Manuscripts: IO 3653c. ff. 1r–2r.

2. Table of the equation of the conjunction of Venus set up as is table 1, but the argument is counted from perigee rather than apogee. The maximum equation is 45;0,0° at 57°.
Manuscripts: IO 3653c. ff. 2r–4v.

3. Table of the equation of the center of Venus set up as is table 1, but the argument is only for 1° to 90°. The maximum equation is 2;14° at 90°.
Manuscripts: IO 3653c. ff. 4v–7r.

4. Table of the equation of the conjunction of Saturn set up as is table 1. The maximum equation is 6;20° at 96°.
Manuscripts: IO 3653c. ff. 7r–10r.

5. Table of the conjunction of Saturn set up as is table 2. The maximum equation is 8;20 at 81° to 84°.
Manuscripts: IO 3653c. ff. 10r–13r.

6. Table of the equation of the center of Saturn set up as is table 3. The maximum equation was 7;40° at 90°; the closest entry that can now be read is 7;39,8° at 89°.
Manuscripts: IO 3653c. ff. 13r — 14r.

7. Table of the daily progresses of the Sun for 1 to 365 days. The table starts with the Sun at its minimum daily progress, that is at apogee. The limits are 0;56,53° and 1;1,23°, so that the mean is 0;59,8°.
Manuscripts. IO 3653c. ff. 14v–17v.

8. Table of the daily progresses of the Moon for 1 to 3031 days. The relationship

110 anomalistic months = 3031 days

is found in *Khaṇḍakhādyaka* 9,5.
Manuscripts: IO 3653c. ff. 17v–42v.

9. Table of the declination of the Sun for 1° to 90°; ε is 24° as in *Khaṇḍakhādyaka* 1,29. A third column gives the differences between the declinations.
Manuscripts: IO 3653c. ff. 42v–43v.

10. Table of Sines for 1° to 90°; R = 150 as in *Khaṇḍakhādyaka* 1,30. A third column gives the differences between the Sines.
Manuscripts: IO 3653c. ff. 43v–45r.

11. Table probably having to do with the time between midnight, the *Khaṇḍakhādyaka's* epoch, and sunrise; the argument is the solar longitude, in this table from (Aries) 1° to 90° (= Cancer 0°). The value at 1° is 14;57 (ghaṭikas), at 90° 12,7 (ghaṭikās). This implies the Babylonian ratio 3:2 of the longest to the shortest day.
Manuscripts: IO 3653c. ff. 45r–45v.

12. A continuation of the table 11 for (Libra) 1° to 90° (= Capricorn 0°). The value 1° 15,0 (ghaṭikās), that at 89° 17;53 (ghaṭikās); the value at 90° is partially torn off, but the 17 can still be read.
Manuscripts: IO 3653c. ff. 45v–46r.

The *Grahamañjarī.*

I. The *Grahamañjarī.*

Nothing is known of this work. In the first verse it mentions Savitā (= Sūrya) as on author on jyotiḥśāstra and refers to the years 2116 and 284 of some unspecified era:

yac chāstram savitā cakāra vipulaiḥ skandhais tribhir jyotiṣam
tasyocchittibhayāt punaḥ pratiyuge saṃskṛtya kheṭasphuṭam,
bhūyaḥ saptamanor nṛpaikayugale varṣe sthite vai gate
vedāṣṭākṣisame yugasya tanute * * *
cākhilāṃ grahamañjarīm * * *

It is not clear what relation either Sūrya or the two dates might bear to this treatise.

II. Manuscripts:
*TC R. 15. 122. 4ff.
*TC R. 15. 123. 33ff.

III. Tables.

The tables associated with the *Grahamañjarī* are of the equation of the planets expressed in units equal to $\frac{1}{3;20} = 0;18$ (except in the case of the manda equations of Venus and Mercury). The argument of the manda equations of the superior planets increases at intervals of 0;18° (there are 300 such intervals in 90°), and that of the śīghra equations in intervals of 0;13,30° (there are 800 much intervals in 180°). The case of the manda equations of the inferior planets is not clear; there are 365 intervals before the maximum equation is attained (at 90°?). The manda equations of the inferior planets are also expressed in units different from 0;18°; these units must be approximately 0;0,6°.

These maximum equations result from interpreting the tables in this way:

	manda equations	śīghra equations
Saturn	26;24×0;18° = 7;55,12°	21×0;18° = 6;18°
Jupiter	17;36×0;18° = 5;16,48°	38×0;18° = 11;24°
Mars	37;24×0;18° = 11;13,12°	2.13×0;18° = 39;54°
Venus	20, 0;10×0; 0,6° = 2; 0, 1°	2.30×0;18° = 45°
Mercury	19,45;39×0; 0,6° = 1;58,33,54°	

1. Table of the manda equation of Mars for 0 to 300; the maximum is 37;24.
Manuscripts: TC R. 15. 122 ff. 3v 4v; TC R. 15. 123 ff. 4v–6v.

2. Table of the śighra equation of Mars for 0 to 800; the maximum is 133.
Manuscripts. TC R. 15. 123 ff. 6v–10r.

3. Table of the manda equation of Jupiter for 0 to 300; the maximum is 17;36.
Manuscripts: TC R. 15. 123 ff. 10v–12v.

4. Table of the śighra equation Jupiter for 0 to 800; the maximum is 38.
Manuscripts: TC R. 15. 123 ff. 12v–16v.

5. Table of the manda equation of Venus for 0 to 365; the maximum is 1200; 10.
Manuscripts: TC R. 15. 123 ff. 16v–18r.

6. Table of the śighra equation of Venus for 0 to 800; the maximum is 150.
Manuscripts: TC R. 15. 123 ff. 18r–22v.

7. Table of the manda equation of Saturn for 0 to 300; the maximum is 26;24.
Manuscripts: TC R. 15. 123 ff. 22v–24v.

8. Table of the śighra equation of Saturn for 0 to 800; the maximum is 21.
Manuscripts: TC R. 15. 123 ff. 24v.–28v.

9. Table of the manda equation of Mercury for 0 to 365; the maximum is 1185;39.
Manuscripts: TC R. 15. 123 ff. 28v–30r.

The <*Grahasāriṇī*>

I. The <*Grahasāriṇī*>

This unnamed and undated set of tables consists of two parts. The first, containing tables 1 to 23, belongs to the Saurapakśa (compare the parameters with those of the *Makaranda*); and the second, containing tables 24 to 28, belongs to the Āryapakṣa.

II. Manuscripts:

IO Burnell 287–288. 116 and 113 pp.

III. Tables.

1. Table of the equation of the center of the Sun in 5 columns. Column 1 gives the argument as 1° to 90°; column 2 the equation, with the maximum being 2;10,30° at 90°; column 3 the differences between entries in column 2; column 4 the increment to (or decrease from) the mean daily motion, with the maximum being 0;2,18° at 1°; and column 5 a function which increases from 0;0,5° at 1° to 0;1,50° at 90°.
Manuscripts: IO Burnell 287 pp. 9–12.

2. Table of the equation of the center of the Moon in 4 columns (tables 4, 6, 8, 10, and 12 are set up in the same way). Column 1 gives the argument as 1° to 90°; column 2 the equation, with the maximum being 5;2,46° at 90°; column 3 the difference between entries in column 2; and column 4 the increment to (or decrease from) the mean daily motion, with the maximum being 1;9,41° at 1°.
Manuscripts: IO Burnell 287 pp. 13–16.

3. Table of the equation of the conjunction of Mars in 3 columns (tables 5, 7, 9, and 11 are set up in the same way). Column 1 gives the argument as 1° to 180°; column 2 the equation, with the maximum being 40;16,24° at 131°; and column 3 the differences between entries in column 2.
Manuscripts: IO Burnell 287 pp. 17–20.

4. Table of the equation of the center of Mars for 1° to 90°. The maximum equation is 11;32,13° at 90°; the maximum increment 0;7,32° at 1°.
Manuscripts: IO Burnell 287 pp. 21–24.

5. Table of the equation of the conjunction of Mercury for 1° to 180°. The maximum equation is 21;31,19° at 112°
Manuscripts. IO Burnell 287 pp. 25–28.

6. Table of the equation of the center of Mercury for 1° to 90°. The maximum equation is 4;27,39° at 90°; the maximum increment 0;1,55° at 1°.
Manuscripts: IO Burnell 287 pp. 29–32.

7. Table of the equation of the conjunction of Jupiter for 1° to 180°. The maximum equation is 11;31,49° at 101°.
Manuscripts: IO Burnell 287 pp. 33–36.

8. Table of the equation of the center of Jupiter for 1° to 90°. The maximum equation is 5;5,59° at 90°, the maximum increment 0;0,27° at 1°.
Manuscripts: IO Burnell 287 pp. 37–40.

9. Table of the conjunction of Venus for 1° to 180°. The maximum equation is 46;22,53° at 137°.
Manuscripts: IO Burnell 287 pp. 41–44.

10. Table of the equation of the center of Venus for 1° to 90°. The maximum equation is 1;45,3° at 90°, the maximum increment 0;1,57° at 1°.
Manuscripts: IO Burnell 287 pp. 45–48.

11. Table of the equation of the conjunction of Saturn for 1° to 180°. The maximum equation is 6; 22,46° at 96°.
Manuscripts: IO Burnell 287 pp. 49–52.

12. Table of the equation of the center of Saturn for 1° to 90°. The maximum equation is 7;39,44° at 90°, the maximum increment 0;0,16° at 1°.
Manuscripts: IO Burnell 287 pp. 53–56.

13. Table of the declination of the Sun in 3 columns. Column 1 gives the argument as 1° to 90°; column 2 the declination, with the maximum being 24° at 90°; and column 3 the differences between entries in column 2.
Manuscripts: IO Burnell 287 pp. 57–58.

14. Table of the latitude of the Moon in 3 columns. Column 1 gives the argument as 1° to 90°; column 2 the latitude, with the maximum being 4;30° at 90°; and column 3 the differences between entires in column 2.
Manuscripts: IO Burnell 287 pp. 59–60.

15. Table of the motion of the Sun for 1 to 9; 10 to 90; 100 to 900; 1,000 to 9,000; 10,000 to 9,000; 100,000 to 900,000; 1,000,000 to 9,000,000; and 10,000,000 to 100,000;000 days (tables 16 to 23 are set up in the same way). The mean daily motion of the Sun is 0;59,8,10,10,24,20,....°.
Manuscripts: IO Burnell 287 pp. 65–68.

16. Table of the mean motion of the Moon. The mean daily motion is 13;10,34,52,3,49,. . . .°.
Manuscripts. IO Burnell 287 pp. 69–72.

17. Table of the mean motion of the lunar apogee. The mean daily motion is 0;6,40,58 42,31,. . . .°.
Manuscripts: IO Burnell 287 pp. 73–76.

18. Table of the mean motion of Mars. The mean daily motion is 0;31,26,28,11,8. . . . .°.
Manuscripts: IO Burnell 287 pp. 77–80.

19. Table of the mean motion of Mercury's conjunction. The mean daily motion is 4;5,32,20,41,51,. . . .°.
Manuscripts: IO Burnell 287 pp. 81–84.

20. Table of the mean motion of Jupiter. The mean daily motion is 0;4,59,8,48,35,. . . .°.
Manuscripts: IO Burnell 287 pp. 85–88.

21. Table of the mean motion of Venus' conjunction. The mean daily motion is 1;36,7,43,37,16,. . . .°.
Manuscripts: IO Burnell 287 pp. 89–92.

22. Table of the mean motion of Saturn. The mean daily motion is 0;2,0,22,53,25,. . . .°.
Manuscripts: IO Burnell 287 pp. 93–96.

23. Table of the mean motion of the Lunar node. The mean daily motion is 0;3,10,44.43,10,. . . .°.
Manuscripts: IO Burnell 287 pp. 97–100.

24. Table of the mean motion of the Sun for 1 to 9, 10 to 90; 100 to 900; 1,000 to 9,000; and 10,000 to 100,000 days (tables 25 to 27 are set up in the same way). The mean daily motion of the Sun is 0;59,8,10,13,3,. . . .°.
Manuscripts: IO Burnell 287 pp. 101–102.

25. Table of the mean motion of the Moon. The mean daily motion is 13;10,34,51,53,41,. . . .°.
Manuscripts: IO Burnell 287 pp. 103–104.

26. Table of the mean motion of the lunar apogee. The mean daily motion is 0;6 40,54,43,8, ...".
Manuscripts: IO Burnell 287 pp. 105–106.

27. Table of the mean of the lunar node. The mean daily motion is 0;3,10,48,8,12,.... .
Manuscripts: IO Burnell 287 pp. 107–108.

28. Table of Sines in 3 columns. Column 1 gives the argument as 1 to 180 in units of 0;30 ; column 2 the Sines, with the maximum being 3437;44,48 57,14;44,48; and column 3 the differences between entries in column 2. The value of π is

$$\frac{6,0,0}{1,54,35;29,36} \text{ or } 21,600 : 6875 \frac{9}{25}.$$

Manuscripts: IO Burnell 287 pp. 109–112.

The *Bhāgapañcāṅga*.

I. The *Bhāgapañcāṅga*.

This set of tables is probably a product of the early nineteenth century.

II. Manuscripts:

*BM Add. 14,365i. 6pp.

III. Tables.

1. Table of times (expressed in ghaṭikās and vināḍīs) associated with longitudes between Aries 0° and Cancer 0°. The table is 12 intervals horizontal and 90 vertical; but the entries never extend to 90. The following table illustrates where each vertical column ends:

column	end	last entry	column	end	last entry
1	74	15; 6	7	87	15;46
2	76	15;13	8	88	15;52
3	78	15;19	9	89	16;0
4	80	15;26	10	87	16;8
5	82	15;33	11	85	16;14
6	84	15;40	12	84	16;26

Above this table are three horizontal columns. each for 1 to 13. The first is entitled ra (the Sun); the entry for 1 is 0^s 5;10° and that for 12 is 3 0;0°. The second is entitled caṃ (the Moon); the entry for 1 is 6 and for 12 is 85. The third is entitled di (the length of daylight); the entry for 1 is 30;12 ghaṭikās and that for 12 is 32;15 ghaṭikās.

To the side of the main table are three vertical columns for 1 to 89. The first gives the hypotenuse of the shadow, the second the shadow itself, and the third a function entitled pādaprabhā; all are expressed in units of which 12 are contained in the gnomon itself. For 1 the hypotenuse is 685, the shadow 683, and the pādaprabhā 400; this is not accurate as:

$$683^2 + 12^2 = 466{,}633$$

and

$$685^2 = 469{,}225.$$

However, at 89 the hypotenuse is 12, the shadow 0, and the pādaprabhā 0. This indicates that the geographical latitude for which the table was computed is exactly equivalent to the obliquity of the ecliptic (for Indians this is generally assumed to be true for the latitude of Ujjayinī).
Manuscripts: BM Add. 14,365i. p. 1.

2. A similar table, for longitudes between Capricorn 0° and Aries 0° (the heading erroneously gives tulādi). There are 14 horizontal intervals and 72 vertical. The following table illustrates where each vertical column ends: ,

column	end	last entry	column	end	last entry
1	48	12;37	8	60	14;20
2	50	13;44	9	62	14;29
3	50	12;47	10	64	14;34
		(13;47)	11	66	14;41
4	52	13;52	12	68	14;47
5	54	14;1	13	70	14;54
6	56	14;8	14	72	15; 0
7	58	14;14			

The entry for the Sun is $9^s\ 1;0^\circ$ at 1 and $0^s\ 0;0^\circ$ at 14. The entry for the Moon is 83 at 1 and 0 at 14. The entry for the length of daylight is 27;14 at 1 and 30 at 14.

The hypotenuse is 686, the shadow 484 (read 684), and the padaprabhā 400 at 1; at 72 they are respectively 12;30, 3;54, and 2;16.
Manuscripts: BM Add. 14,365i. p. 2.

3. Table of rising-times expressed in ghaṭikās for 1 to 6 signs horizontal, 1 to 30 degrees vertical. The entries for 30° are:

Aries	3;58	Pisces
Taurus	4;27	Aquarius
Gemini	5;10	Capricorn
Cancer	5;36	Sagittarius
Leo	5;31	Scorpio
Virgo	5;18	Libra
	30; 0	

Manuscripts: BM Add. 14,365i. p. 3.

4. Table of the time since sunrise of the rising of each of the beginnings of the six signs that rise during the day when the Sun is at the beginning of each of the twelve zodiacal signs. The table is for 1 to 6 signs horizontal, 1 to 12 signs vertical; the entries in the last vertical column are the lengths of daylight when the Sun is at the beginning of each sign.

Aries	30; 0	Libra	30; 0
Taurus	31;20	Scorpio	28;40
Gemini	32;24	Sagittarius	27;36
Cancer	32;50	Capricorn	27;10
Leo	32;24	Aquarius	27;36
Virgo	31;20	Pisces	28;40

Manuscripts: BM Add. 14,365i. p. 3.

5. Pictures of the 28 nakṣatras with an indication of the number of individual stars in each.
Manuscripts: BM Add. 14,365i. p. 3.

6. Table of various parameters associated with the 28 nakṣatras. The titles of these parameters are:

1. u dhru (udayadhruva)—eastern limit of constellation.
2. a dhru (astadhruva)—western limit of constellation.
3. ma dhru (madhyadhruva)—mean longitude of constellation.
4. śarabham—latitude of star.
5. śara aṃ—latitude multiplied by 20.
6. krāṃ ma (krāntir madhyā)—declination of ecliptic longitude.
7. krāṃ spa (krāntiḥ spaṣṭā)—declination of star, i.e. sum of columns 4 and 6.
8. madhyam ca—? } these two parameters are related both to
9. spa ca—? } the star's longitude and to its latitude.
10. dinārdha—half-length of time above horizon.
11. ma u (madhya udaya)?
12. khama pha (khamadhyaphala)—longitude of midheaven when the star is in the ascendent.

In the following table I give only entries 1, 2, 4, 7, 8, 9, 10, 11, and 12 as 3 is the mean between 1 and 2, 5 is a multiple of 4, and 6 is the difference between 7 and 4.

	1		2		4		7		8	9	10	11		12	
Asvinī	0ˢ	5;20	0ˢ	10;40	10	N	13;12°	N	+11	+ 44	15;44	84;48	S	3ˢ	12°
Bharaṇī	0	17;0	0	25;0	12	N	20;22	N	+28	+ 68	16;8	88;2	N	3	22
Kṛttikā	1	6;20	1	9;40	5	N	19;25	N	+48	+ 64	16;4	88;59	N	4	8
Rohiṇī	1	20;40	1	17;20	5	S	12;48	N	+60	+ 44	14;44	84;24	S	4	20
Mṛgaśiras	2	5;20	1	28;40	10	S	10;57	N	+73	+ 40	14;40	82;33	S	5	3
Ārdrā	2	9;40	2	2;0	11	S	10;40	N	+74	+ 38	15;38	82;16	S	5	6
Punarvasu	3	2;0	3	6;0	6	N	29;50	N	+83	+103	16;43	78;34	N	6	3
Puṣya	3	5;0	3	16;0	0		22;52	N	+78	+ 78	16;18	85;32	N	6	16
Āśleṣā	3	19;20	3	14;20	7	S	22;45	N	+77	+ 54	15;54	87;19	S	6	17
Maghā	4	9;0	4	9;0	0		18;21	N	+61	+ 61	16;1	89;57	S	7	7
Pūrvaphālgunī	4	24;0	5	2;0	12	N	24;22	N	+42	+ 82	16;22	84;2	N	7	22
Uttaraphālgunī	5	0;40	5	7;20	13	N	22;51	N	+33	+ 76	16;16	85;33	N	8	0
Hasta	4	23;40	6	1;20	11	S	7;0	S	+10	— 26	14;34	64;36	S	8	11
Citrā	6	3;40	6	2;0	2	S	3;12	S	— 4	— 11	14;49	68;24	S	8	23
Svāti	6	5;40	7	0;20	37	N	29;48	N	—24	+ 99	16;39	78;36	N	9	7
Viśākhā	7	2;20	7	1;40	1	S	11;22	S	—22	— 45	14;15	60;14	S	9	20
Anurādhā	7	14;40	7	13;20	2	S	19;30	S	—59	— 66	13;54	52;6	S	10	5
Jyeṣṭhā	7	21;0	7	19;0	3	S	21;6	S	—62	— 72	13;48	50;30	S	10	12
Mūla	8	4;40	.7	29;20	8	S	28;57	S	—63	—100	13;20	42;39	S	10	27
Pūrvāṣāḍhā	8	16;40	8	13;20	5	S	28;0	S	—78	— 95	13;25	43;36	S	11	15
Uttarāṣāḍhā	8	22;40	9	19;20	5	S	28;20	S	—80	— 97	13;23	42;18	S	11	21
Abhijit	7	24;20	9	8;4	62	N	38;39	N	—79	+128	17;8	69;45	N	11	24
Śravaṇa	8	25;0	9	15;0	30	N	6;12	N	—83	+ 18	16;18	77;48	S	0	12
Dhaniṣṭhā	9	4;20	9	27;40	36	N	13;8	N	—78	+ 42	15;42	84;34	S	0	28
Śatabhiṣak	9	20;0	11	20;0	0		15;6	S	—50	— 50	14;10	56;30	S	2	1
Pūrvabhādrapadā	10	17;0	11	3;0	24	N	10;36	N	—45	+ 35	15;35	82;12	S	2	6
Uttarabhādrapadā	10	28;0	11	16;0	26	N	16;54	N	—30	+ 57	15;37	88;30	S	2	14
Revatī	0	0;0	0	0;0	0		0		0	0	15;0	31;36	S	3	4

Manuscripts: BM Add. 14,365i. p. 4.

7. Table of half-times above the horizon expressed in ghaṭikās for 1 to 28 nakṣatras horizontal, and for 1° to 90° vertical. The nakṣatra-columns end at (discrepancies between the ends and final entries in this table and the entries in columns 11 and 10 of table 6 are due to scribal inaccuracies):

	End	Final entry
Aśvinī	85°	15;44
Bharaṇī	88	16;8
Kṛttikā	89	16;8
Rohiṇī	85	15;14
Mṛgaśiras	83	15;40
Ārdrā	83	15;38
Punarvasu	79	16;43
Puṣya	86	16;18
Āśleṣā	88	15;34
Maghā	89	16;1
Pūrvaphālgunī	84	16;22
Uttaraphālgunī	86	16;16
Hasta	64	14;34
Citrā	69	14;59
Svāti	79	16;39
Viśākhā	61	14;15
Anurādhā	53	13;54
Jyeṣṭhā	51	13;48
Mūla	43	13;20
Pūrvāṣāḍhā	43	13;25
Uttarāṣāḍhā	43	13;23
Abhijit	70	17;8
Śravaṇa	78	15;18
Dhaniṣṭhā	85	15;42
Śatabhiṣak	57	14;10
Pūrvabhādrapadā	83	15;35
Uttarabhādrapadā	89	15;57
Revatī	72	15;0

Manuscripts: BM Add. 14,365i. pp. 4–6.

Appendix. The Girinārāyaṇajñāti.

This Gujarātī family plays an important role in the history of the transmission of many of the texts mentioned in this catalogue. It first appears in Juṇāgaḍh in the early sixteenth century, assumed the surname Bhaṭṭa in the early seventeenth century, and disappears in the middle of the eighteenth century. The manuscripts of the Girinārāyaṇajñāti formed a part of the collection presented by the Gaikawar of Baroda to the East India Company in 1809.

The following attempt to reconstruct a genealogy of the family remains very tentative.

I 1. Devarāja (*fl. ca.* 1500), father of II 1.

II 1. Vidyādhara (*fl.* 1521), son of I 1. Finished copying Anup 5127 (*Vāmanajātaka* of Vāmana) at Jīrṇadurga in Saṃ. 1578 = A.D. 1521 during the reign of Pātasāha Mudāphara (Muẓaffar II of Gujarāt, who ruled from 1511 to 1526).

II 1. Nīlakaṇṭha (*fl.* 1555), son of II 1. Finished copying IO 2408b (*Laghukhecarasiddhi* of Śrīdhara) at Jīrṇadurga on 25 March 1555 for himself and his brothers Viṣṇu (III 2), Raghunātha (III 3), and Narasiṃha (III 4).

III 2. Viṣṇu (*fl.* 1555), son of II 1.

III 3. Raghunātha (*fl.* 1555), son of II 1.

III 4. Narasiṃha (*fl.* 1555), son of II 1.

IV 1. Harihara (*fl. ca.* 1580), father of V 1. Wrote the *Gaṇitacūḍāmaṇi* based on Āśādhara's *Grahajñāna*.

IV 2. Puruṣottama (*fl.* 1599), son of III 4. Finished copying IO 2408a (*Gaṇitacūḍāmaṇi* of Harihara IV 1) on 9 November 1599.

V 1. Nārāyaṇa Bhaṭṭa (*fl. ca.* 1600), son of IV 1.

VI 1. Nīlakaṇṭha (*fl.* 1626–1637), son of V 1. Finished copying IO 2648 (*Kheṭasiddhi* of Dinakara) on 7 April 1626; and IO 2464b (*Grahajñāna* of Āśādhara) on 10 July 1637.

VI 2. Mukunda Bhaṭṭa (*fl.* 1649-1665), son of V 1. Finished copying IO 2372a (*Tājikapaddhati* of Keśava) at Rājadurga (Rājkoṭ) on 12 April 1650; IO 2076a (*Jātakapaddhati* of Keśava) at Rājakoṭa on 25 November 1649; and IO 2372b (*Muktāvalīpaddhati* of Śiva) on 7 January 1665 for his son Viśvanātha (VII 1).

VI 3. Vidyādhara Bhaṭṭa (*fl.* 1638–1643), son of V 1. Wrote the *Grahavidyādhara* at Rājakoṭa under Rāja Vīrabhadra in 1638, and the *Pañcāṅgavidyādharī* at Jīrṇagaḍha under the same rāja in 1643. Copied IO 2464c (*Grahajñāna* of Āśādhara).

VII 1. Viśvanātha (*fl.* 1665), son of VI 2.

VII. 2. Bhāṇajī (*fl.* 1672), son of VI 3. Finished copying IO 2110 (*Yogayātrā* of Varāhamihira) on 2 February 1672.

VII 3. Mukundajī Bhaṭṭa (*fl. ca.* 1670), father of VIII 1.

VIII 1. Prabhujī Bhaṭa (*fl.* 1726–1740), son of VII 3. Finished copying IO 2091c (*Laghujātaka* of Varāhamihira) at Nūtanapura on 13 June 1740 during the reign of Jāṃma Śrītamāṃcī (?) for the brothers (and his sons) Jīvarā (IX 1), Vallabhajī (IX 2), Morārajī (IX 3), and Bhavāni (IX 4). Copied IO 2529e B (*Tithikalpadruma*).

IX 1. Jīvarāja (*fl.* 1740), son of VIII 1. Owned IO 2049c (tables) and IO 2520a (*Javanajātaka* of Yavanācārya and *Bālabodhajātaka* of Haridatta).

IX 2. Vallabhajī (*fl.* 1740), son of VIII 1.

IX 3. Morārajī (*fl.* 1726–1740), son of VIII 1. Finished copying IO 2529b (*Pañcāṅgavidyādharī* of Vidyādhara VI 3) on 7 December 1726. Copied IO 2083c (*Grahavidyādhara* of Vidyādhara VI 3) for his brothers Jīvarāja (IX 1) and Vallabhajī (IX 2); and IO 2529e A (*Tithikalpadruma*).

IX 4. Bhavāni (*fl.* 1740), son of VIII 1.

? X 1. Nānu Bhaṭa (*fl.* between 1740 and 1809). Owned IO 2529e B (*Tithikalpadruma*).